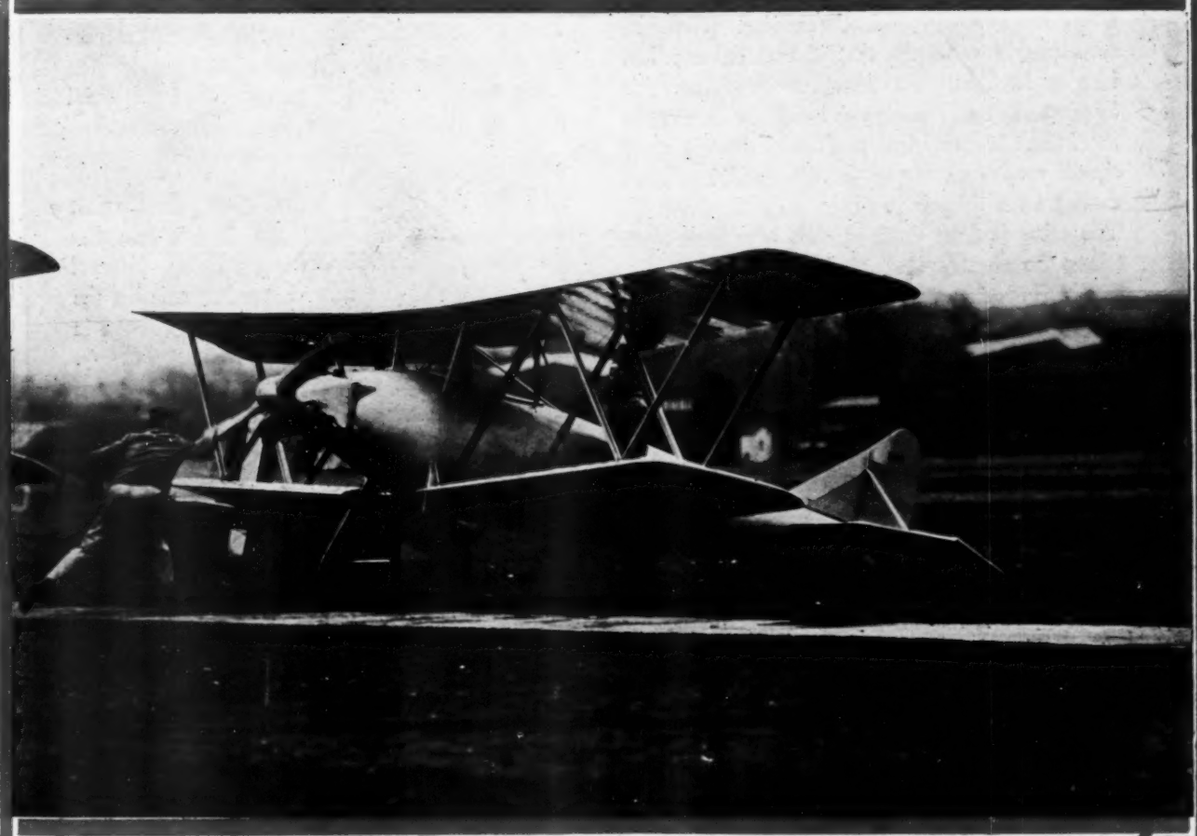
AVIATION

The Oldest American Aeronautical Magazine

MAY 5, 1924 Issued Weekly PRICE 10 CENTS



"Contact!" — The Navy's Longren experimental plane (60 hp. Wright engine) ready to take off

Official Photo, U. S. Navy

VOLUME XVI

NUMBER 18

SPECIAL FEATURES

WHERE THE MONEY GOES

PROGRESS OF THE WORLD FLIGHTS

CURTISS CO. OFFERS PLANT TO McCOOK FIELD

CONGRESSIONAL HEARINGS ON THE AIR SERVICES

GARDNER PUBLISHING CO., INC.

HIGHLAND, N. Y.

225 FOURTH AVENUE, NEW YORK

Entered as Second-Class Matter, Nov. 22, 1920, at the Post Office at Highland, N. Y. under Act of March 3, 1879.

PUBLISHER'S NEWS LETTER

The compilation of the cost to the Government of Aviation aroused the interest that we expected—perhaps a little more than we thought possible. We have had two distinct reactions. The first, from people generally, that it was an excellent idea to let the public know how much our Air Services are really costing as it will emphasize the importance of aviation and help show that it should receive much greater study and intelligent consideration than it has been given in the past. The other is from those officials who have been telling the country that airplanes could not be bought in adequate numbers because Congress would not grant sufficient appropriations. They seemed to feel that the disclosure of such a large sum might have a tendency to curtail appropriations in the future. We do not share such fears. We do believe, however, that great economy can be effected by consolidations of aeronautic activities and the elimination of duplication.

* * * *

President Coolidge last week in New York made the following very significant statement:

"At present our country does not need a greater outlay of expense, but a greater application of constructive economy."

This feeling applies with especial force to our aviation expenditures. When it is known that the government is paying almost as much for the upkeep of our naval aircraft carriers as it appropriates for our efficient Air Mail, there ought to be a very favorable reaction in favor of using this practical and public serving utility. Take the pay item alone—$17,000,000 pay for Army and Navy Air Services—$1,900,000 for the whole Air Mail without night flying. The pay roll for civilian employees at McCook Field is greater than the entire Air Mail appropriation. Probably the same would be true of the Naval Aircraft Factory. It is just such comparisons as these that will prove helpful in the long run, we believe. We have never known harm to come from open discussion of government expenditures. We believe that if our aviation expenditures could be put into budget form, with exact statements of what purposes money is to be spent for, there would soon come about a complete reorganization of aerial activities.

* * * *

Take the figures in round sums. In the last five years since the War the Government has spent, say, $500,000,000 on aviation. General Patrick gave as the cost of wartime aviation the figure $382,121,113.50 in an article printed in the February, 1923, issue of *Current History*. The civilians who were supposed to be in charge of this "billion dollar aircraft scandal" have been criticized up and down the land for extravagance and waste. If we have spent more since the War than for the War the question naturally arises: Did we get more during the War for our money than we have for a like sum spent during peace? Such questions deserve a complete answer and we do not doubt that it will be given to Congress and to the public.

* * * *

So much for the story of the cost of Aviation. A number of enquiries have been received about these news letters, some correspondents asking the name of the person responsible for them so that they could write more personally. Much against our inclination we shall follow the excellent example of our good friends, Mr. C. G. Grey of *The Aeroplane* and add significant initials so that the blame and the criticism can be placed on one pair of shoulders. Candy makers usually do not eat much candy. Jewelers do not wear their products. In the same way, good taste should make those who give publicity to others seek anonymity, but we yield to the request of our friends and will sign these letters hereafter with a simple—L.D.G.

MAY 5, 1924

AVIATION

VOL. XVI. NO. 18

Published every Monday

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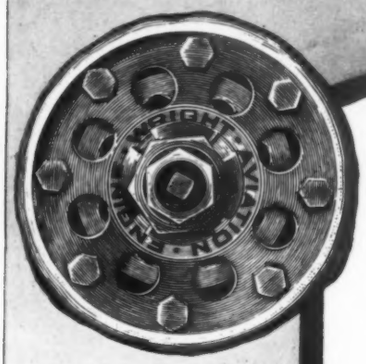

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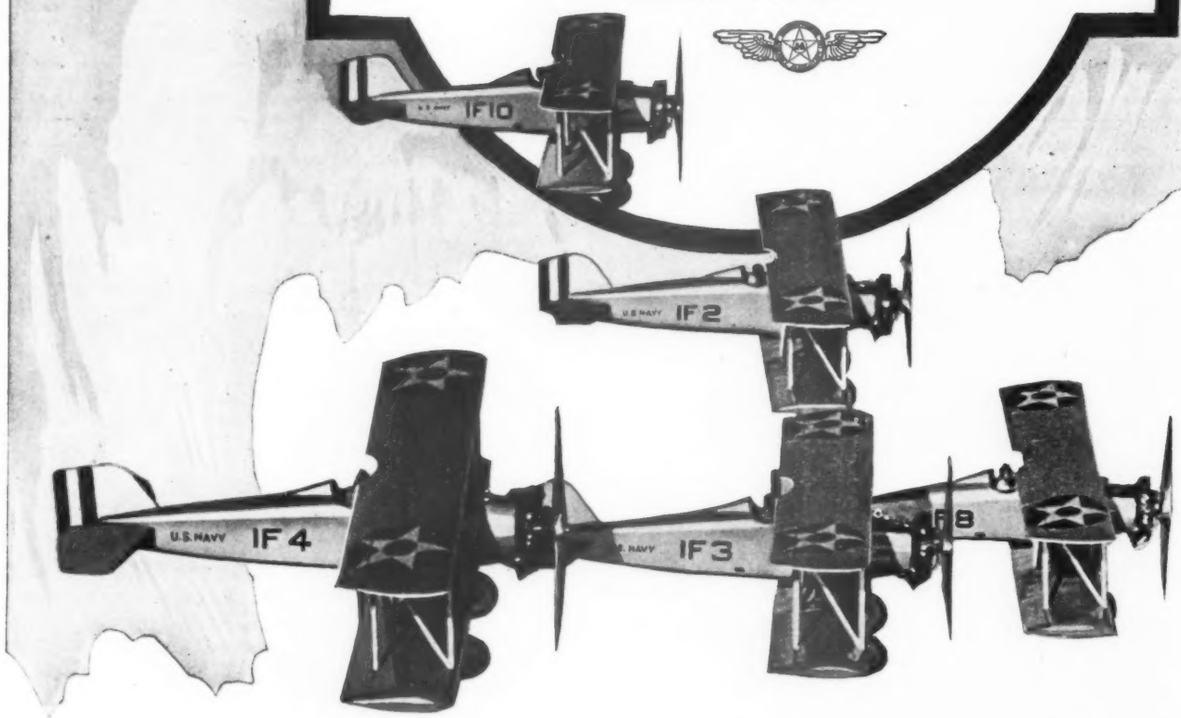

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Vol. XVI MAY 5, 1924 No. 18

Where the Money Goes

THIS week we print the second of a series of articles dealing with the expenditures of the Government for aviation. We do not wish to claim that these articles are complete or exhaustive studies of the subject. But, such as they are, they will give the reader a fairly comprehensive idea of what happens to the money which Congress appropriates each year for the Government Air Services. At the same time, this serial contains enough material to begin a controversy which, we hope, will make these costs available for frank and open discussion.

If the Army Air Service was not as intent on publishing an "official magazine," it might be possible for other publications to secure fuller data on this interesting subject.

On a letter head, dated April 24, 1924, bearing the names of General Patrick, General Mitchell and other officers the following illuminating statements are made: *"U. S. Air Service* is published for the Association and is maintaining official contact. Our sources of information have widened so rapidly that it is enabled to publish data not available to other aeronautical publications. If you want to back us up, your answer is a check. We need your moral as well as financial support."

However, the various testimonies before the Appropriations Committee of the House of Representatives disclose sufficient facts to show how important a matter the whole question has become.

Anti-Aircraft Propaganda

THE Coast Artillery Corps have now started to tell the country that it can protect it from aircraft. Until recently, the old line Naval officer has been the most partial skeptic about aircraft. The bombing tests and the arguments of Admiral Moffett have changed the attitude somewhat, so that now it is even admitted that aircraft are a useful "adjunct" to the fleet.

The Coast Artillery propaganda is shown in the following accounts of a recent Saturday afternoon "demonstration" in New York.

"The thrills of an air attack in actual warfare were experienced yesterday by the crowds which assembled at Fort Totten when the Sixty-second Coast Artillery held the first of a series of four anti-aircraft days. Big guns raked the sky over the fort for hostile airplanes, and last night the searchlights played on real airplane targets.

"The program, starting at 2:20 o'clock, was hardly under way when the thrills began. Out of a clear sky an airplane swooped down over the demonstration field and dropped a message to the commanding officer at the fort.

"The message was signed by Lieutenant M. L. Elliott, observer, and was dated Smithtown, L. I. It contained a warning that a hostile formation of five de Haviland bombing planes was approaching the fort from the northeast, and that at 2:50 P. M. over East Hampton, L. I., the altitude of the formation was 3,000 feet, and the speed eighty miles per hour.

"Immediately the assembly call was sounded, and the long combat train got under way. There was a long rumbling and thundering of trucks and guns as the implements of warfare got into position, with three-inch guns, machine guns, and searchlight batteries, telephone, radio and ambulances ranged about the field. Regimental headquarters were established in the bandstand.

"Then from the northeast five bombing planes appeared, which was the signal for action, and the old fort fairly rocked under the heavy fire from the anti-aircraft guns. The planes, repelled by the attack, trailed off eastward, defeated in their object.

"Captain W. M. Cravens of the Sixty-second Artillery talked on the future development of anti-aircraft material. After showing that it required twenty-four bombing planes to work eight hours to sink the undefended battle-ships New Jersey and Virginia off Cape Hatteras, Captain Cravens described four new types of anti-aircraft weapons now in process of development."

Still another account went further. It predicted almost complete protection from aircraft.

"Enemy airplanes in the next war will do well to keep out of reach of Uncle Sam's newest arm. The air is going to be untenable for bombing planes flying at an altitude of 10,000 feet or less. Combat and scout machines to keep out of danger will have to climb 30,000 feet."

Such statements should be met by our Air Service with facts which show the number and cost of anti-aircraft guns that would be required to do the things they claim. And then the percentage of hits should be tabulated. When an "observer" can report to an anti-aircraft battery the object of a flight, the exact speed at which they will fly and their precise altitude then opera bouffé target practice can be indulged in by the Coast Artillery to its heart's content.

A Wonderful Flight

FLYING men all over the world who are following reports of the remarkable progress Lieut. Pelletier d'Oisy, the French "semi-world" flier, is making on his proposed flight from France to Japan, will have the deepest admiration not only for the professional skill of this pilot, but also for his great endurance.

The fact that this is a "rough-and-tumble" venture, without any advance preparation, and that it is being undertaken with a stock observation plane of the French army air service, only make the feat the more remarkable.

Where the Money Goes

How $67,241,327.95 Was Spent in 1922-23 for Government Air Services

Last week AVIATION printed a summary of the government expenditures for its Air Services during the fiscal year 1922-23, making a total of $67,241,327.95. Of this sum $34,759,807.01 was spent for Naval Aviation, with several more million dollars for aircraft carriers and special bureau work. The Army Air Service cost $28,144,131.97. The remaining items were for the Air Mail and the National Advisory Committee for Aeronautics. The figures were taken from the report of the Hearings before the House Appropriations Committee. It is difficult to get the costs of particular operations as they are not given in detail, but it is hoped that a discussion of some of the items will lead to further itemization, so that the whole subject of costs may be studied with greater care.

The Cost of Helium

Almost as interesting as the cost to the Government of its Air Services are the figures scattered through the Hearings on the subject of helium.

Approximately $10,000,000 has up to now been invested in helium plants by the Government. The actual cost of this gas per thousand cubic feet varies from $80 to $100. This does not take into account any depreciation or interest.

There have been about 6,000,000 cu. ft. of helium gas produced each year. Allowing 10 per cent for depreciation and 5 per cent for interest, as would probably be done in commercial operation, a sum of $1,500,000 would have to be added to the cost of 6,000,000 cu. ft. of helium produced each year, or about 25 cents a cubic foot or $250 a thousand cubic feet. About $600,000 was spent for the production of helium at the plants, making the operating cost about 10 cents a cubic foot or $100 a thousand cubic feet. Using this basis of figuring, which is not the Government's method but a commercial basis, it would seem to indicate that helium, as at present produced, would cost on a commercial basis about $350 a thousand cubic feet. As a commercial company would probably claim that the Government's methods were not those of a commercial organization, let the cost, including depreciation and interest, be taken at one half the $350 per thousand cubic feet or $175 per thousand cubic feet. This is allowing only 100 per cent for overhead, which is extremely conservative.

As Admiral Moffett has said many times that the Shenandoah is mainly being operated to determine the commercial possibilities of airships, a most interesting series of costs become evident.

The Shenandoah requires roughly 2,100,000 cu. ft. of helium. At $175 per thousand cubic feet it costs therefore $367,500 to fill the big air cruiser.

Secretary Denby stated at the hearing that on the trip to St. Louis, during which the Shenandoah flew 1,100 mi., there was a loss of 15 per cent of helium through valving. This would indicate a loss of $55,125 worth of helium on the trip, or at the rate of about $5 per mile.

These figures have been developed to open up the question of the commercial possibility of using helium in airships. The cost of hydrogen, according to General Patrick, is $7.50 a thousand cubic feet as compared to $175 for helium on a commercial basis. Another interesting fact brought out at the hearing is that the supply of natural gas from which helium is being extracted will probably be exhausted in twenty years.

It is apparent then, that here is a problem for the Army and Navy and promoters of lighter-than-air craft to solve in a manner that will controvert the above statements. It is hoped for the sake of helium that it can be done.

McCook Field

The expense of the Engineering Division of the Air Service has always been the most discussed item of all Air Service expenditures.

The annual appropriations for McCook Field have been as follows:

1919-1920	$5,274,315.00
1920-1921	5,000,000.00
1921-1922	4,300,000.00
1922-1923	3,500,000.00
1923-1924	3,000,000.00
1924-1925	2,850,000.00
Total for 6 years	$23,924,315.00

At McCook Field there are 1067 civilian employees. Their rate of pay is as follows

1 Legal Advisor	$5,700.00
1 Chief Accountant	5,200.00
3 Aeronautical Engineers	5,000.00
2 Aeronautical Designers	5,000.00
2 Mechanical Engineers	5,000.00
1 Planning Expert	4,200.00
1 Legal Assistant	4,200.00
3 Aeronautical Engineers	4,000.00
3 Mechanical Engineers	4,000.00
1 Physicist	4,000.00
1 Cost Accountant	3,900.00
1 Drafting Superintendent	3,800.00
1 General Foreman	3,800.00
2 Production Managers	3,600.00
2 Patent Experts	3,600.00
2 Purchasing Agents	3,600.00
9 Aeronautical Engineers	3,600.00
52 Assistants	$3,000 to 3,600.00
117 Clerks , Mechanics, etc.	$2,500 to 3,000.00
112 between	$2,240 and 2,500.00
120 between	$2,000 and 2,240.00
152 between	$1,800 and 2,000.00
204 between	1,500 and 1,800.00
274 below	1,500.00

General Patrick stated that mechanics were paid the same wages as are paid for the same class of labor in Dayton. The pay roll totals about $2,000,000 a year.

Aside from the above expenses for civilian employees, General Patrick asked for $2,500,000 for the pay of civilians at repair stations and depots. The number of such employees is given as 1886. At Fairfield alone there are 631, at Rockwell Field 201, at San Antonio 499, at Middletown 125.

Summarizing, the total expense of the 2953 civilian employees of the Air Service is $4,500,000. This has always been criticized by the industry as it shows that many more men are employed by the Air Service that does not manufacture planes than in the whole aircraft industry.

At present McCook Field is paying rental of $60,000 a year for a site that has a valuation of $900,000.

Regarding the moving of McCook Field to the new site General Patrick says: "Although not absolutely ideal, it offers many advantages, is eminently well suited for flying purposes and has been tentatively accepted by the Secretary of War." In a letter of June 29, 1923, General Patrick recommended including $1,000,000 in the 1924 Budget for the initiation of a building program, fencing, grading, installation of gas, water, power and drainage facilities, for the erection of a warehouse and central heating plant, "all of which are necessary before the construction of quarters, hangars, machine shops and laboratories is undertaken. An additional $4,000,000 will be required for the completion of this project and these funds should be provided all in 1925 or else divided equally between 1925 and 1926."

This is not the place to discuss the accomplishments of

the Engineering Division, but with an expenditure of over $23,000,000 in six years, a prospective annual expenditure of about $3,000,000, and $5,000,000 for a new station, a very complete study of the purposes, achievements and necessity of such large expenditures should be made.

Purchase of Planes

The report shows that at the present time 755 airplanes are in commission. This figure includes 330 DH4B's, 163 JNH's and 13 SE5's, a total of 506, leaving 249 service planes.

Of service planes in commission, all of which have been purchased since the war, the following list is given:

Pursuit		
MB3A's		99
Bombardment		
MBS1	41	
MB2	2	
Owl	1	44
Training		
Vought	15	
SE5	40	
MB3	3	
MB3M	2	
Special and Experimental Types	46	106
Grand total		249

Of course, the inclusion of the Owl, and of training, special and experimental types of planes would reduce the service types to 44. In other words, the Air Service appears to have in service at the present time only 44 airplanes that can be classed as modern service equipment. As General Patrick stated that he had no more good planes in storage, the mere list of 2,068 which includes machines being rebuilt, repaired and disassembled can be disregarded. As he pointed out, 25 per cent of these planes are unserviceable, which reduces all the planes available to 1550. The planes on order are 150 DH4M's, 25 TW8's, 20 TW3's, and 20 special types.

Number of Planes Available

General Patrick estimates the planes available or to become available in the near future on the basis of the 1923 and 1924 appropriations as follows:

July 1, 1923	1970	(1531 war produced)
July 1, 1924	988	(686 war produced)
July 1, 1925	576	(204 war produced)
July 1, 1926	289	(102 war produced)

The requirements for the present Air Service are 1655 airplanes, 10 airships, and 25 balloons. As stated, "these two tables indicate that unless immediate steps are taken to remedy this condition, the Air Service will become inoperative within a few years."

The parallel between the way appropriations are spent for helium, civilian employees and projects, such as the $5,000,000 for McCook Field, and the number of planes produced, is the most important matter that can be studied by Congress and the War Department. If after spending $23,000,000 on Engineering at McCook Field in six years, with a large and well paid staff of aeronautical engineers, there have only been produced the few types of airplanes indicated, then the question to be taken up is whether or not the work at McCook Field is justifying its cost and whether or not it is advisable to make large expenditures for a permanent station which has produced so little.

Next week there will appear an analysis of the Navy air expenditures.

Annual Meeting of N.A.C.A.

The semi-annual meeting of the National Advisory Committee for Aeronautics was held at the Smithsonian Institution April 24, in the offices of Dr. Charles D. Walcott, who is also the Chairman of the Committee. Dr. Joseph S. Ames, Chairman of the Executive Committee, outlined the general program to be undertaken next year for the development of aircraft, with particular reference to the improvement in the efficiency of airplanes, increasing their safety, and investigations to make them more stable, more controllable, and more maneuverable in flight.

General Patrick, Chief of the Army Air Service, and Admiral Moffett, Chief of the Bureau of Aeronautics in the Navy, delivered illustrated addresses depicting the uses of aviation in the Army and in the Navy. The honor guests were Secretary Weeks; Secretary Wilbur; Postmaster General New; Dwight N. Davis, Assistant Secretary of War; Col. Theodore Roosevelt, Assistant Secretary of the Navy; Col. Paul Henderson, Second Assistant Postmaster General. Dr. S. W. Stratton, president of the Massachusetts Institute of Technology, made a report as Chairman of the Subcommittee on Power Plants for Aircraft, dealing with recent progress in the development of aircraft engines. Dr. George K. Burgess, Director of the Bureau of Standards and Chairman of the Subcommittee on Materials for Aircraft, reported the need for a study of problems for the improvement of materials used in the construction of aircraft, with a particular view to the development of all-metal aircraft. Dr. Ames, of Johns Hopkins University, Baltimore, also outlined the present state of aerodynamical development, and suggested a number of problems for future investigation.

Four members of the Committee had just returned from a visit of inspection to the Committee's research laboratories at Langley Field, Va., namely: Orville Wright, of Dayton, Ohio; Dr. William F. Durand, of California; Professor Marvin, Chief of the Weather Bureau; and Maj. L. W. Mc Intosh, Chief of the Engineering Division of the Army Air Service and Commanding Officer at McCook Field, Dayton, Ohio. Each of these members reported to the Committee the results of his observations and submitted his recommendations for problems to be attacked.

An Aviation Epigram

"The airplane is the only weapon of national defense of value in time of peace." This illuminating observation was made by Lawrence D. Bell in a recent radio talk. It should become one of the epigrams of aviation. If the public could disassociate aircraft from submarines, battleships, cruisers, destroyers, artillery, and ordnance and look on it as a great peace vehicle that will in time revolutionize our cities and country life, a much different attitude would be found in Congress.

Let us have this fine phrase in front of us constantly. Clip it out of one of the following pages and paste it in a place where it will often be seen by your friends as well as by yourself.

"The Airplane is the Only Weapon of National Defense of Value in Time of Peace"

Clip this out and paste it on your desk

Curtiss Co. Offers Plant for McCook Field

Garden City Factory Ideal For Engineering Division of Air Service

For $148,000 in cash over and above the mortgages the Government now holds on the Curtiss plants, the Air Service can secure the entire manufacturing and engineering equipment of the Curtiss Aeroplane & Motor Co. located at Garden City, Long Island. That there will be a very serious consideration of this offer by the War Department goes without saying. Compared with the necessity of spending $5,000,000 to move McCook Field to another site near Dayton that has neither water facilities, nor is yet graded, there can be little question that Congress, which after all has the final word in this matter, will give much thought to the new proposal before it commits the government to the expenditure of large sums on another government air station.

This offer was made to the Secretary of War by the Curtiss Aeroplane & Motor Co. on March 3, 1924, in the following letter:

Terms of the Offer

"In the annual report of the Chief of the Air Service for the fiscal year ending June 30, 1923, on page 17 he states as one of his conclusions that—"the land offered the United States Government by the citizens of Dayton is suitable for flying purposes and should be accepted." He also recommends to the war Department the inclusion of $1,000,000.00 in the 1924 budget for the initiation of a building program on that property which would ultimately cost $5,000,000.00. This field would be used for the experimental and engineering work of the Air Service.

"When he made this recommendation he did not know that the engineering laboratories and construction plant owned by our corporation at Garden City were available for this purpose. In our judgment it is more desirable for this experimental work than the present McCook Field or than the new property near Dayton.

"Our corporation now offers to sell to the War Department its said plant at Garden City with its entire equipment, including twenty acres of ground on which it is situated, for the sum of $1,000,000.00 complete, free and clear of all mortgages.

"Our plant was built in 1917 by our subsidiary company, the Curtiss Engineering Corporation, which was organized specially to do the research and creative work of the Curtiss organization. It is a very complete plant and includes within it aerodynamical laboratories having one of the largest wind tunnels in the world, physical laboratories, chemical laboratories and motor laboratories, as well as a complete manufacturing equipment for the construction of practically every element necessary to aircraft development. The equipment of the plant itself is familiar to many of your subordinates. It has adequate space for drafting rooms and for airplane construction, and it has a fine office building.

Airplane view of the plant and flying field of the Curtiss Aeroplane & Motor Co., Inc., at Garden City, Long Island

"In this plant have been created within the last few years all of the high speed airplanes for both the Army and the Navy, which now hold the world's records, as well as outstanding types of military and naval aircraft for service use.

"The plant is splendidly located for the purpose. It practically adjoins Mitchel Field, which is owned by the War Department and which is in active use as a flying field, fully equipped with quarters for officers and men. It is within forty-five minutes of the New York market and has developed in this locality a corps of highly trained aircraft engineers and workmen. It is the center of the flying activities of the East.

"One million dollars was the cost of the plant to our subsidiary company, and we are prepared to sell it to the War Department for the same sum, free and clear of all mortgages. In the event that this offer is acceptable to you we are willing to have you deduct from the purchasing price the first and second mortgages now held by the United States against other property owned by this company. These mortgages aggregate $852,000.00 and will be due in 1926.

"Therefore, for a total cash expenditure of $148,000.00 the War Department can secure a home for the Engineering Divison of the Air Service, ideally located and available for immediate occupancy.

"We venture to contrast this proposition with the one suggested by the citizens of Dayton, which involves a present appropriation of $1,000,000.00, which is merely on account

of a contemplated expenditure of $5,000,000.00. Ours has the advantage of being a completed going proposition which could be used within a very short period of time by the Air Service, whereas there would inevitably be delays and even cessation in the experimental division's work while it is waiting for the new plant to be prepared for use.

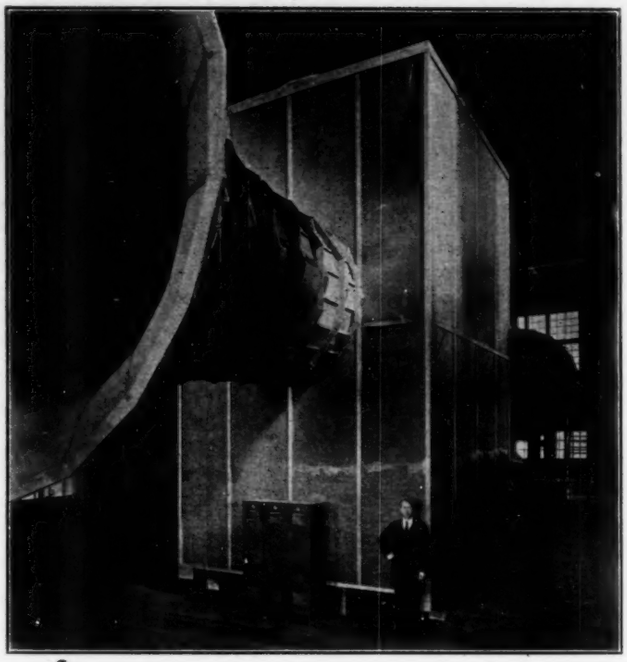
"With our proposition but one appropriation will be necessary. Apparently it would be necessary for the Congress to appropriate a million dollars each year for the next five years to complete the new Dayton plant, which when finished would not be superior to our plant, unless the War Department is preparing to go into the manufacture of aircraft on a production basis.

"We likewise call your attention to the fact that ever since the war there has been a very distinct division of opinion with reference to the advantage of Dayton as a location for the engineering laboratories of the Air Service. Its great distance from the center of flying operations and from the most important elements of the industry has handicapped its operations. We believe that a majority of the members of the Air Service would be in favor of locating these experimental laboratories at some more convenient place than Dayton.

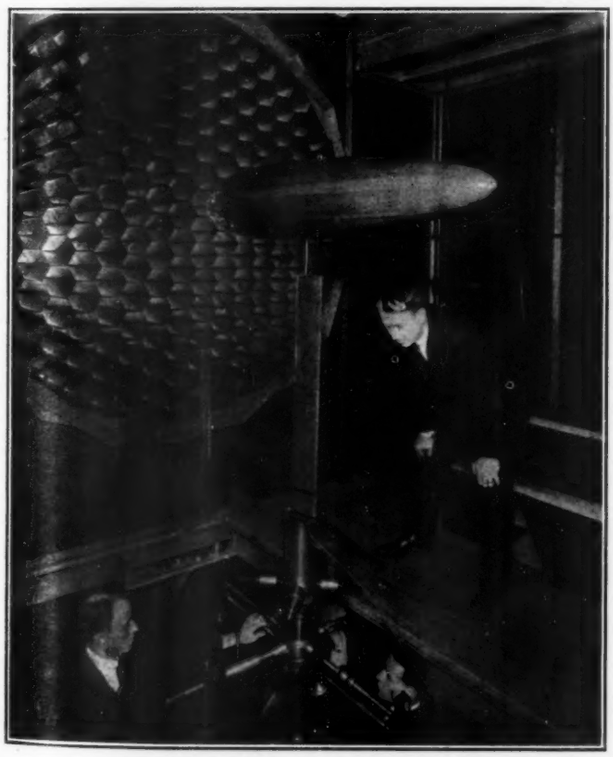
"If this offer is accepted the Company will continue to do whatever experimental work is necessary in its buildings located on the Curtiss flying field which adjoins Mitchel Field at Garden City, and would transfer its aircraft construction to its Buffalo plant which is already equipped to handle it. This Buffalo plant is adequate to meet the demands for Curtiss products both in airplanes and motors for some years to come, so far as we can now judge what the quantities of our orders will be.

"For your consideration we are handing you herewith a descriptive folder of the engineering plant at Garden City, as well as a similar folder covering our equipment at Buffalo. With this data the Congressional Committee which is considering the Dayton proposition will be in possession of all the facts concerning the alternative arrangement which we propose herein and which we sincerely believe to be a great advantage to the Government."

The matter is now being studied by the War Department with a view to reaching a tentative decision. Then the matter will be submitted to the Congressional Committee that will have to pass on the appropriations for a new site for the Engineering Division.



Wind tunnel at the Curtiss plant in Garden City



Aerodynamic balance of the Curtiss wind tunnel at Garden City

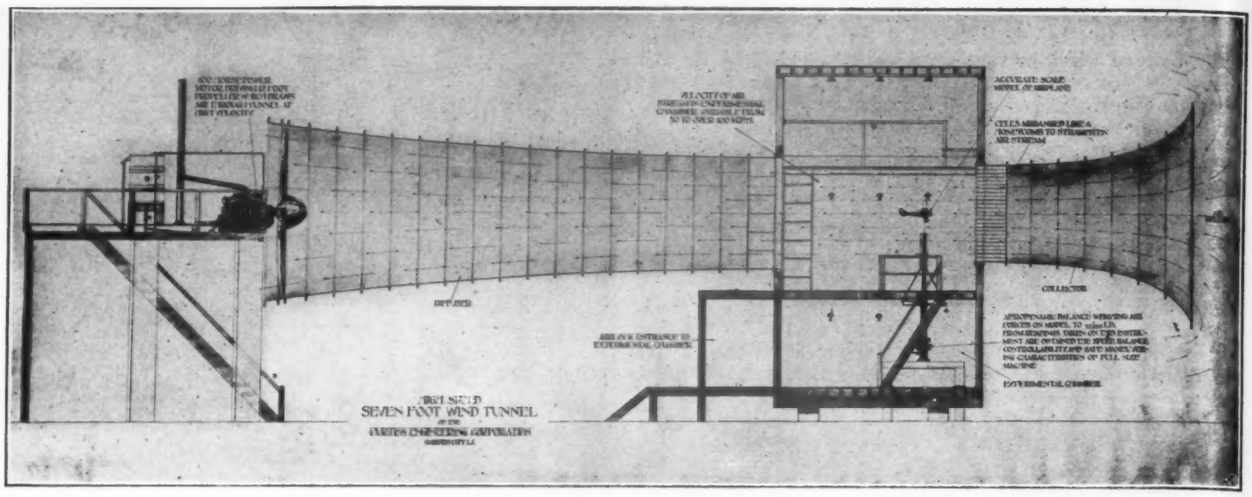
Advantages of the Offer

The manifold advantages that would result from locating the Engineering Division of the Air Service at Garden City—entirely apart from the financial merit of the proposition—will be apparent from the following considerations:

1. The plant is within five hours' train time from Washington, or two hours by airplane, which would permit the maintenance of a much closer liaison between the Engineering Division and the office of the Chief of Air Service.
2. The plant is near the material markets of New York City, where all the necessary raw materials, instruments, guns, ammunition, cameras and lens, can be quickly procured.
3. The plant has been long enough established so that there is available a large number of highly trained mechanics.
4. It is near Mitchel Field, a large flying station now owned by the Government which would easily accommodate all engineering flying activities as well as the flying which is now being carried out at the Field. Mitchel Field is connected with the plant by a little over one-half mile of well paved road.
5. It is believed that considerably more work of an engineering and flying nature could be accomplished in the locality of Garden City due to the milder climate and the greater number of good flying days during the winter time.

The Curtiss Company's Garden City property comprises an area of 20 acres which affords ample room for any expansion in the way of testing equipment or buildings that the Air Service might require for some years to come. The buildings are all of a construction which permits easy expansion. The buildings now located on the property are of a substantial nature constructed of steel and white pressed brick, and the floor plan and general arrangement of buildings seems to be ideally suited for the Air Service's engineering requirements.

The general offices, engineering department and drafting room space is about equal to that now at McCook Field. The power house has ample capacity for heating and furnishing power for activity that might be carried on and is sufficient for the operation of the complete plant at capacity. The wind tunnel building and physical testing laboratories are the most modern type and the wind tunnel, which is in con-



Cross section of the 7 ft. diameter high speed wind tunnel at the Curtiss plant in Garden City

tinuous operation is one of the largest wind tunnels in the world, and the results derived from it check with the results of other approved wind tunnels in the country. The chemical laboratory and equipment is of sufficient size to take care of production airplane work to the capacity of the plant, therefore, it should take care of any amount of research work which the Engineering Division would be called upon to carry on.

The dry kilns are in a separate building and are of the most modern type and have a capacity of about 25,000 board feet. There is a motor laboratory which, though it may be slightly too small for the operations carried on by the Engineering Division, is located so that it could be easily expanded and it is also located in a position where the noise from motor testing would be the least objectionable. The heat treat, sand blast and plating equipment are all modern and are situated in a separate building.

The floor space in the Garden City plant comprises 139,330 sq. ft., which is sufficient to take care of the activity required by the Engineering Division's work. An ideal arrangement is possible for any special research work, motor tests, propeller tests, machine gun tests and development work on cameras, instruments, radio, parachutes, etc. The plant equipment due to the fact that the airplane manufacture has been carried on here for a number of years, would be ideally suited for use by the Engineering Division personnel.

The factory building measures 200 x 300 ft., and has a ground floor area of 59,000 sq. ft. with 11,750 sq. ft. in the balconies. Every modern factory facility is installed. Among other equipment the plant has a 5-ton locomotive crane, humidity control apparatus, spacious tool room, complete tools, machinery and equipment that are immediately available for moving in the Engineering Division.

Air Power

A Letter from Alexander McAdie

Editor, AVIATION:

In your leading editorial of April 7 you speak with approval of Lord Londonderry's speech in the House of Lords March 4, 1924, when he says: "The effective strength of a country in the air must be measured and determined by the size and efficiency of its Independent Air Force."

This is sound Gospel; and your own words following a few lines below are equally pertinent: "Air Power is the first line of defense by virtue of the rapidity and punishing ability with which it can strike."

These words should be printed in large Caps so that they could be pasted on our daily calendars, constantly reminding us of a rather important Truth. Sooner or later those charged with the problems of national defence will recognize their significance.

Our Navy, Marine Corps and Army Officers are fine fellows—none better—and they grow wiser with the years. But it was Browning who said: "All men grow good; but so slowly."

Recall that a Board of Army Officers in 1913 in Great Britain turned down brusquely a proposal of the Wright Brothers for the employment of airplanes in military operations. A year later, their country got a severe jolt, caused by enemy planes over London and elsewhere. Such stupidity meant the loss of many lives in the early years of the war.

And what a sad confession it is which we find in the diary of a distinguished British General who needed planes and could not get them. Why? At the time, Churchill was at the head of the Navy and controlled aviation. A direct appeal to the Navy Head might have been favorably received, but the making of that appeal would have been construed as an attempt to go over the head of Kitchener, then War Secretary. Great men have been known to show irritability over little things; and the displeasure of one's chief may lead to recall and loss of command.

Students of the Gallipoli campaign hold that if Hamilton had been given an adequate air force, the heights could have been readily taken.

The conclusion is obvious. Too many cooks spoil the broth. Once more, let the words of wisdom be repeated:

"AIR POWER BY VIRTUE OF THE RAPIDITY WITH WHICH IT CAN STRIKE AND ITS PUNISHING ABILITY IS THE FIRST LINE OF DEFENCE."

ALEXANDER MCADIE

A.C.C.A. News

George P. Tidmarsh, special eastern representative of the Boeing Airplane Co., of Seattle, Washington, was elected on April 8 to the Board of Governors of the Aeronautical Chamber of Commerce of America. Mr. Tidmarsh succeeds Lawrence B. Sperry who recently made the supreme sacrifice in the cause of aviation.

Among the firms and individuals who have applied for membership in the Aeronautical Chamber of Commerce of America since the first of the year, are the following: Armour and Co., Chicago; Dayton Wire Wheel Co., Dayton, Ohio; Interflash Signal Corp., New York City; General Electric Co., Schenectady, N. Y.; Hamilton Maxwell, Inc., New York City; Wellington, Sears & Co., New York City; John L. Callan, President, Airships, Inc., Hammondsport, N. Y.; Ralph S. Damon, Curtiss Aeroplane & Motor Co., Garden City, N. Y.; Edgar N. Gott, President, Boeing Airplane Co., Seattle, Wash.; Howard Sheaff, Engineer, L.W.F. Co., College Point, L. I., N. Y.; Roy Q. Stone of Hamilton Maxwell, Inc., New York City; George P. Tidmarsh, special eastern representative, Boeing Airplane Co., Washington, D. C.

Congressional Hearings on the Air Services

Testimonies of Generals Hines and Patrick Bring to Light Many Interesting Points

The House Committees on Naval and Military Affairs have been conducting hearings on the matter of duplication of the functions and activities of the Army and Navy Air Services. Hon. Thomas S. Butler of Pennsylvania is acting as chairman of the joint committee. The main question that has appeared where there seems to be a wide difference of opinion between the Services is the coast defense problem. Congress passed a law which distributes the functions in one way and the Joint Army and Navy Board has given a different ruling. The Committee is trying to reconcile the two.

General Hines' Testimony

The hearings opened on April 1, with Maj. Gen. John L. Hines, Deputy Chief of Staff, the first to be heard.

"Yes, there is an Aeronautical Board," he said. "It has the Chief of Air Service of the Army and the Chief of the Air Service of the Navy as two of the members of the board. The last report we had on this subject from the Aeronautical Board discussed all of the different installations of the Army and Navy and it simmered down to three places where there might be some duplication. The others were dismissed, having been gone over by the Aeronautical Board after cooperating to the fullest extent possible at those stations. The three in which it was decided that there might appear to be some duplication were Coco Solo, Ford Island, T. H., and North Island, San Diego, Calif. After discussing these three projects and also the efforts that were being made at these three stations for cooperation it was decided that they were cooperating at those three places just as fully as they could. The Aeronautical Board recommended against any further consolidation of the two Air Services and the Joint Board approved that recommendation."

In reply to a question as to whether Congress should make another effort to define the functions of the two Services on the coast, General Hines said, "My advice would be to let it alone. I would suggest that Congress not make any further attempt to define the functions of the two Services. We have a mission assigned to each of the Services. The Joint Board has assigned the missions. The Secretary of War has approved the missions. The only thing he has not approved is the joint program for the Army and Navy. This was not involved, though, in his withholding his approval on the big project for the development of the Air Services in the two services. For instance the Navy called for about $19,000,000 per annum for five years in their program, and the Army called for $25,000,000 during ten years in their program. The Secretary has withheld approval of that program for the present.

In speaking of the Navy's use of hydroairplanes, General Hines said: "I am not an air expert. I am just telling you what I understand. My understanding is that the Navy is getting away from the hydroairplane because it is too slow and vulnerable against enemy attack. They want something that goes faster and can carry a bigger load. I would not want to go after an enemy in a hydroairplane if I could get a plane that goes twice as fast."

Referring to aircraft in war he continued: "There is no doubt that it is going to be a very important factor in any future warfare. I think it will be greater than in the last war, because there has been very much development since the last war. A plane can now perform more varied evolutions. I do not believe the United States is keeping pace with other nations in the development of the Air Service."

Aircraft in Warfare

Referring to the advisability of combining the Air Services of the Army and Navy under one head, General Hines said: "I have a decided opinion about it. From a military, strategic or technical viewpoint, I think it would be impossible. From an economical standpoint, I think it would be all right. In time of peace it would be all right, but in war it would be impossible. You could not get the cooperation required in carrying on an attack. To get the desired cooperation one must have the man under his thumb. If he is independent it would not work."

At the second day's hearings General Patrick, Chief of Air Service gave his views on the duplication of the Services.

General Patrick's Testimony

After referring to the functions of the Aeronautical Board, he said: "At present there are very few places where there is any real duplication. While the two Services are working along somewhat parallel lines, there is always a twilight zone in which they overlap slightly, but the existing duplication is negligible. There is no field that is directly operated by both Army and Navy at present. There is no reason in the world why they should not be combined, if Congress so desires. There is no reason why there should be joint stations, occupied by the Army and Navy, the facilities being common to both. It is a mere matter of money and a mere matter of order."

"The functions of the two Services," he continued, "differ somewhat and their missions differ. I think that there are some differences of opinion between the Army and Navy as to precisely how they would operate in time of war. It is my own personal opinion that it might be well to study this question again in order to ascertain just what is the mission of each service. The doctrine was laid down by the Joint Board in 1919 and published in 1920. That was prior to the experiments that were carried out against naval craft, and it was before the efficacy of aircraft in attacking naval vessels was really known. I think the time is really ripe for a renewed study of the way in which the two Services should operate in time of war, and there should be a clearer definition of the missions of the two. Given that clear definition, I can see no reason for duplication. Unless these missions are defined, I am satisfied that in the future there may probably be a considerable duplication.

Some Examples of Duplication

"The Navy is developing an air-cooled engine, and so is the Army. We agreed, however, after a thorough discussion, that they were working along proper lines, and that it was well to have that development carried on in that way. So I do not call that duplication.

"We are doing a certain amount of experimental and research work. I think that in some of the items there is a small amount of duplication. We think we have developed the best bomb sight that has ever been invented. I learned later that the Navy was developing a bomb sight also. It was done, I understand, by the Ordnance Department and we did not know about it. I think of scarcely any other cases where there is any real duplication now.

"When the question comes up as to the role that each Service should play, particularly in coast defense, I think there is danger of duplication there.

"There is a question now as to just exactly what should be the role of the Army and the role of the Navy in coast defense. We feel that it is the mission of the Army. We feel that we should have air installations, air units, in sufficient strength to spread all along the coast. We would then have the Army air force located at some central point, and when it was apparent that an attack was coming at any point along the coast line, we would concentrate opposite that point.

The Three Mile Limit

When in 1702 the highest authority proposed that the territorial sovereignty should extend to a marine league—about as far as a cannon then shot—it was held, I think, or they believed, that within that distance any attack could be repelled from shore. As the range of sea coast weapons increased, it became increasingly dangerous for the opposing

fleet to get within their radius of action. As aircraft, which are merely long range guns, have greatly increased that radius of action, I think we can control from the shore any sea within the limit to which aircraft can reach; in other words, from 100 to 200 mi.

"The Navy's doctrine, as I understand it, is that the Navy shall be at sea. Its mission is at sea. It operates its aircraft from vessels at sea. Now any navy that puts to sea without an air force is really committing suicide. The Navy's doctrine itself requires that the aircraft that they keep on shore should be reduced to a minimum in order that the fleet may be reinforced and have its air force. If you endeavored to provide for the patrol of that area by the Navy as well as provide an air force for the fleet, I think you would duplicate.

"We have shown that we can fly over the water just as well as over the land. I have provided in Hawaii two flying boats for my men, and they also have land planes. The question came up of reconnoitering out at sea, and they preferred the land planes. They are faster and more readily handled.

Army Defends Naval Air Stations

"The Navy contends that they shall have certain shore stations from which they can operate in connection with fleet operations at sea. We defend them, and that is where there is liable to be duplication. If the Navy is going to fly land planes, they must have shore stations, and we must have stations along the coast, and we say that if the Navy has to operate from shore stations they can operate from ours. It is necessary for us to have facilities sufficiently close to its stations, Navy yards, etc., so that we can send from a central point, if they be threatened, a proper air force and defend it.

"I think it is very questionable whether the Navy really needs any shore stations, except possibly a few.

"If you are going to agree that we are to have a Navy that is sufficient to itself to defend us absolutely from any attack in any way whatever, then you can just abolish the Army. As it stands today, the air component of the Army could not defend the Atlantic coast any more than I think the air component of the Navy could defend it.

Duplication of Training and Research

"There is no dispute between the Army and Navy about keeping experimental stations and training stations, but I have always held, and I think the Navy holds now, that it would be advantageous to combine those if it could be done economically, because there is wasted overhead in both places. I think that it would be a wise policy for the experimental work in both Services to be under one head and carried on jointly. It would save expense to the Government. To a considerable extent, the same line of reasoning would follow in regard to training stations. I have always believed that all primary flying could be concentrated at one point. I have believed that a great deal of the advanced flying that we do could be done jointly. I think that a small percentage of the flying done by the Navy might have to be done by itself, and elsewhere.

"I am of the opinion that probably we could consolidate the experimental work of the Army and Navy and the training of their recruits more than is being done today. It would be a saving to the Government.

"In the future when the question of shore stations comes up, I believe we can avoid a great deal of duplication and a great deal of extra expense by a proper understanding on the part of the Army and the Navy and a proper definition of their missions.

The Next War

"We feel, and very strongly, that in the next war there is going to be a struggle for supremacy in the air, and that is really going to be the first thing that will be done. Before the coming of submarines and aircraft England never feared invasion. England has practically no coast defenses—very few—that amount to anything at all. It relied on its navy to keep its own homeland free from an enemy.

"I think the Navy should concentrate their stations in one place, reduce the overhead expenses at the various places, and maintain their service from the operating base of the fleet. I do not go to the point of saying that there should only be one base on one coast, and one on the other, but certainly they should be concentrated to the greatest possible degree.

Air Defense Needs Single Control

"In time of war the air defense of any locality must be under one control. You cannot divide it. That would be just as futile as it would be to attempt to divide the army in time of battle, and give one wing of the army to one commander, and another wing to another. There has got to be one supreme commander, just as there was in Europe the necessity for a supreme commander. So the defense of the air must be under one control in order to be effective.

"Under the present doctrine, the Navy patrols the coastal lanes, and in consequence the protection of coastal shipping is a Navy function. I think that we can do that as well as the Navy, and patrol those lanes as well and protect them as well. It is not a duplication, because under the existing doctrine the Navy does it. I say that we ought to do it. If they have that duty laid down for them, they will have to have some operating stations in order that they may do that work, but I say they are unnecessary.

Value of Shore Fortifications Lessened

"Regarding shore fortifications, we think the coming of aircraft has minimized the importance of fortifications greatly. The fortifications have become the third line of defense.

"If I were laying out a training course for an aviation force to serve with land troops and a course to serve with fleet at sea, about 75 per cent of the two courses would be identical. Both would carry the same kind of explosives, but in different quantities and different containers. Seventy-five per cent of the training would be flying, and the remainder would be training in flying seaplanes, and also training in the duties of naval officers. When it comes to sending Army airmen over the sea, the difference would not be much.

"The opinion everywhere is that the two Services are cooperating as closely as they can. There are few differences of opinion. The possibility of joining the Services is quite a question and the War Department is opposed to it. If the missions of the two Services are clearly defined, I do not see any great advantage in it."

Next week AVIATION will print a digest of the testimony of Admiral Moffett and Captain Seaton, Secretary of the Aeronautical Board.

Effect of Slipstream Obstructions on Air Propellers

N.A.C.A. Report No. 177

This report, prepared for the National Advisory Committee for Aeronautics by E. P. Lesley and B. M. Woods, describes an investigation to determine the effect of slipstream obstructions on air propellers.

The screw propeller on an airplane is usually placed near other objects, and hence its performance may be modified by them. Results of tests on propellers free from slipstream obstructions both fore and aft are therefore subject to correction for the effect of such obstruction, and the purpose of the investigation herein described was to determine the effect upon the thrust and torque coefficients and efficiency, for previously tested air propellers, of obstructions placed in the slipstream; it being realized that such previous tests had been conducted under somewhat ideal conditions that are impracticable of realization in flight.

At the start it was planned to use obstructions representative of the nose of the fuselage, of radiators, or of other parts of an airplane structure, but a consideration of the wide variety of forms thus defined led to the selection of simple geometrical forms for the initial investigation. Such forms offered the advantage of easy exact reproduction at another time, or in other laboratories, and it was believed that the effects of obstructions usually encountered might be deduced or surmised from those of the ones chosen.

A copy of Report No. 177 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

The Great Inter-Continental Flights

Americans Still in Alaska—Maclaren Reaches India—French Flier Off for Fast Paris-Tokyo Flight

The American World Flight is making slow progress. The plane Seattle, with a new engine installed, finally hopped off on the 25th from Kanatak and reached Chignik. Major Martin's report to the Chief of Air Service reads as follows:

"Left Kanatak, caldron of winds, at 1:15. Flew in snow storm entire distance, with strong head winds. Landed at Kunluk Bay, 4:45, to get bearings and wait lull in storm. Left 5:15, arriving Chignik 5:50. Followed coast line to keep going. Terrible trip. Rose Kanatak 3 p. m. Calm, but tide rose sufficiently to get ship from creek. Constructed drag pulley (from) ship to bay by standing cat(erpillar) tractor. Sea very rough and southeast winds and snowing. Afraid to remain at Kanatak. (Will) remain Chignik two days to check engine and plant. Most thankful to survive ordeal Kanatak."

Major Martin's Difficulties

Further details of Major Martin's forced landing at Kanatak (Portage Bay) are furnished by his laconic telegram to the Chief of the Air Service. No mention is made of the hardships encountered or of anxious moments, but it takes little imagination to read between the lines. The telegram reads as follows: "Forced down 2.40, 15th, hole in crankcase. Taxied near shore, anchored, spent night in ship. Moonlight calm, clear and cold. Destroyers arrived 5.30 a. m. 'Hull' came into bay, was leaving at 9 when she sighted us. We had used up all our signal ammunition. Starter broken. Helpless if anchor dragged. Struck two best days in eight months."

Major Martin's new motor arrived at Kanatak on the 19th from Dutch Harbor, Unalaska, probably a record for speedy transportation in this part of the country. With the help of Superintendent Reed of the Standard Oil Co. and a few natives the motor was installed and the Seattle was ready to fly by April 22. However the weather was bad, which may be seen from Major Martin's wire to General Patrick, reading: "Strong winds and storm clouds each day; also rain or snow; temperature about 20. This is windiest place in journey." On the 24th the plane was still held up by bad weather and it was reported that there was a blizzard raging all along the Alaska coast.

The crews of the three ships which reached Dutch Harbor on April 19 were very weary after their long flight in extremely bad weather, but started right in getting their ships back into first class shape. Lieutenant Wade's ship, the Boston, was hauled out to have a new engine installed. The Chicago and New Orleans were beached and minor repairs made.

Major Martin's forced landing and the persistent bad weather has considerably delayed the planes and they are now two weeks behind schedule.

The officers of the destroyer Ford which is now at Kashiwahara Bay, Kuriles, to furnish patrol and other assistance to the World Fliers, recently went on a hunt but soon found themselves ambushed by a couple of Japanese who were watchmen for a cannery. The Japanese explained, after cordial relations were established, that they had seen no other human beings for months, but had feared that the Russians would come to the island. After explanations the Japanese promised future assistance in the game hunting and in the World Flight.

British World Flight

The British World Flight expedition headed by Sqn. Ldr. A. Stuart Maclaren, R.A.F. on April 23 reached Karachi, India, thus completing the first of the five divisions into which their globe circling route is divided. The length of the first division, from Calshot to Karachi is 4890 mi., or approximately one fifth of the total distance.

Following is a brief log of Maclaren's flight:

March 25—Start from Calshot, near Southhampton. Landed at Havre, France, owing to bad weather.

March 26—Havre-Lyon, France.

March 27—Lyon-Civitavecchia, Italy. Landed owing to darkness.

March 28—Civitavecchia-Rome, Italy. Damaged wing float on taking off.

March 29—Repairs and overhaul in Rome.

March 30—Rome-Corfu, Greece. Landed owing to damaged reduction gear and cracked crankcase. New engine installed.

April 16—Corfu-Athens, Greece.

April 17—Athens-Cairo, Egypt.

April 18—Overhaul and rest.

April 19—Cairo-Bagdad, Irak.

April 22—Bagdad-Bender Abbas.

April 23—Bender Abbas-Karachi.

Total distance, 4890 mi.; time 28 days.

Vulture Again Held Up

The Vulture made particularly fast progress from Cairo on. Up to Bagdad it followed the airway which the Royal Air Force mail plane service uses on a weekly schedule, cutting across the northern part of the Arabian desert. The airmen spent two days in Bagdad to obtain some badly needed rest, for they were reported as having arrived there exhausted from lack of sleep. After this 800 mi. hop they resumed the flight on April 22 covering the 1000 mi. leg from Bagdad to Bender Abbas, and on the following day they flew some 700 mi. from Bender Abbas to Karachi.

These remarkable long distance hops have placed Maclaren abreast of his schedule, despite the loss of two weeks on the island of Corfu owing to a damaged engine which had to be replaced with an engine shipped from England. It appears from English contemporaries that the original engine of the Vulture not only stripped its propeller reduction gear, but that the crankcase was cracked too. It is a curious coincidence that both Maclaren and Major Martin, the American World Flight leader, should have been held up by the same kind of trouble and one which is an extremely rare occurrence.

On Saturday, the 26th, the Vulture took off from Karachi, bound for Nasirabad, India, but the flight was interrupted by a forced landing at Partu, 172 mi. from Ajmere, in Rajputana. The cause of the landing was engine trouble of some sort, which was, however, serious enough to make Maclaren return to Karachi to obtain a new—the third—Napier Lion engine. It is stated that the engine will have to be brought from Irak by steamer, which will delay the British World Flight about a fortnight.

Two Kinds of World Flight

The following editorial is reproduced from the New York *Sun*, as it makes a particularly telling picture of the differences which characterize the American and British World Flights:

"Twice British and American fliers have met in a kind of cosmic competition—once in attempting the Atlantic flight and once in attempting a flight around the world. Each time the two have made an interesting contrast.

"It has not been the contrast the world would have guessed at twenty years ago. Men would have said then that the American effort would represent an amazing but slap-dash ingenuity, highly seasoned with personal initiative. They would have predicted as a British effort a carefully organized undertaking, probably made by the Government with the cooperation of such imperial resources as the British navy could offer.

"Instead, both times the American effort has been the carefully planned governmental affair, and the British effort has

been one of daring private initiative. The United States Navy sent the three N-Cs across the Atlantic in 1919 by way of the Azores. For the British Hawker and Grieve represented the private effort of the Sopwith Aviation Company, and the successful non-stop flight of Alcock and Brown was a Vickers-Vimy affair. In 1924 the American Army has organized our effort, and Navy destroyers are cooperating to make it a success. Major Maclaren, on the other hand, is being financed by the Vickers, Napier and Asiatic Petrol Company interests. Doubtless the British government will extend him all possible assistance, but no gunboats will skirt Arctic seas to send him radio messages about the weather, or to pick him up if he lands on a sea of floating ice.

"Major Maclaren will probably get more cheers than Major Martin and his companions. The world's heart goes out to the lone fighter, to the gallant and not too systematized fling at glory. But a great deal more can be said for the American way of flying around the world than for the British.

"This is the case simply because the American method looks toward the consolidation of progress, while the British method is suggestive. If Major Maclaren flies around the world he will prove possibilities and may encourage a more considered and organized effort. But if the Americans get around they will have done pioneering in such an effort.

"It is a fine and brave thing for a flier to attempt 30,000 mi. with comparatively little cooperation. But if the world makes 30,000 mi. flights regularly, their success will depend on organization. The best work fliers can do today is to show what facilities are available for cooperation, and what additional facilities would be desirable.

"Locomotives, steamships and automobiles traveling long distances depend on rails, harbors and garages. They become successful as they can depend on known routes and depots. Air travel must be built on a similar basis. The American effort takes this into consideration and makes a trial not only of flying, but at making an air route, predicting weather, maintaining radio communication and fixing air stations."

A French Semi-World Flight

Although France cannot, because of her economy program, afford to organize a round the world flight, a French military airplane is now attempting to fly from Paris to Tokyo and cover half the globe in record time. The machine is a Breguet 19A2 two-seater corps observation machine which is fitted with a 400 hp. Lorraine-Dietrich 12-cyl. engine. The pilot is Lieut. Pelletier d'Oisy, of the French air force, and he is accompanied by a mechanic, Sergeant Vesin.

Unlike the American and British flights, the French venture will be a rough-and-tumble venture with machinery and elements, for no preparations have been made ahead along the route. The French under-secretary for aeronautics had no funds to provide for fuel depots and spare parts, so that the two airmen will have to depend on themselves alone to get out of difficulties.

The itinerary of the French semi-world flight from Paris to Tokyo is by way of Bucharest, Rumania; Aleppo, Turkey; Bagdad, Irak; Bender Abbas, Persia; Rangoon, Burma; Saigon and Hanoi, Indochina; Hongkong; Shanghai and Pekin, China; and Soeul, Corea.

Pelletier d'Oisy and Vesin left Villacoublay airdrome, near Paris, at 4:30 a. m. on April 24, the pilot remarking before the take-off that he would push on to the Far East "if circumstances permit." They landed the same day at Bucharest, having covered the 1250 mi. separating the two capitals in less than 11 hr. This is practically one-fourth of the distance covered by Squadron Leader Maclaren in several weeks.

From Bucharest on the French flier's log reads as follows:

Friday, 25th—Bucharest-Aleppo, Syria, 1000 mi. in 9 hr. non-stop.

Saturday, 26th—Aleppo-Bagdad, Irak, 500 mi. in 5 hr. non-stop.

Sunday, 27th—Bagdad-Bu Chehr, Persia, 560 mi. in 6 hr. Stop at Basra, Irak.

Monday, 28th—Bu Chehr-Bender Abbas, Persia, 430 mi. in 5 hr. non-stop.

Thus, in five days Pelletier d'Oisy and Vesin covered a total distance of 3730 mi.—a truly wonderful performance, which beats all records for distance traveled by one airplane carrying the same crew. The fliers were delayed by violent winds in Mesopotamia (Irak), which forced them to land at the British air station in Bagdad when they expected to reach Bu Chehr before nightfall.

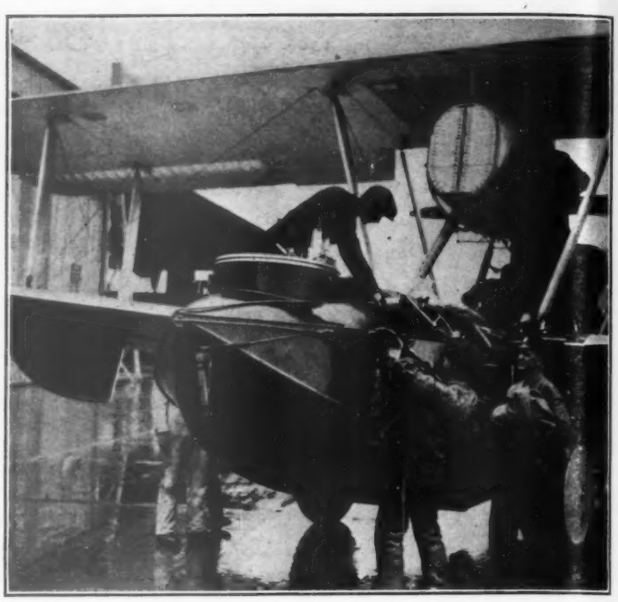


Photo Kadel & Herbert

Last minute preparations for the British World Flight: stowing away heavy clothing for use on the Arctic Sections of the flight

Portugal-Macao Flight

Two Portuguese naval aviators, Captains Brito Paes and Sarmento Beiros, are now attempting a flight from Lisbon, Portugal, to Macao, a Portuguese treaty port near Canton, China.

The two airmen left Lisbon on April 1 and reached Tripoli, Lybia, on April 13. On the 21st they pushed on to Heliopolis, near Cairo, Egypt, on the 23rd they reached Damascus, Syria, and on the 26th Bagdad, Irak.

No information is available regarding the type of plane the Portuguese airmen are using, but judging from their itinerary, it would seem to be an amphibian. It is possible that the machine is one of the five Fokker amphibian float monoplanes with 360 hp. Rolls-Royce engine which Admiral Gago Coutinho and Capt. Sacadura Cabral had built for their proposed round the world flight.

Aerodynamic Forces on Airship Hulls

N.A.C.A. Report No. 184

This report, by Max M. Munk, describes the new method for making computations in connection with the study of rigid airships, which was used in the investigation of Navy's ZR1 by the special subcommittee of the National Advisory Committee for Aeronautics appointed for this purpose. It presents the general theory of the air forces on airship hulls of the type mentioned, and an attempt has been made to develop the results from the very fundamentals of mechanics, without reference to some of the modern highly developed conceptions, which may not yet be thoroughly known to a reader uninitiated into modern aerodynamics, and which may perhaps for all times remain restricted to a small number of specialists.

A copy of Report No. 184 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

LIGHT PLANES AND GLIDERS

Edited by Edmund T. Allen

Two Types of the Light Plane

The amateur designer usually approaches the problem of building his light plane by looking over the data that have been collected on all the existing types of light plane construction. Often he has the general layout quite definitely decided upon before he begins work, and he uses either a handbook or a compilation of the characteristics of the best light planes to determine the exact dimensions and plan form of his design.

For the assistance and general information of such designers it will be useful to compare the characteristics of two of the successful British light planes. They are the Vickers Viget and the Parnall Pixie. Both of these machines are the products of established aircraft construction. Both are in production, and are on the market each at about $2400. They are, however, entirely different in general character, and they show by their diversified form the latitude allowable by the standard practice in light plane construction.

A Small Orthodox Biplane

The Vickers light plane is a conventional single bay biplane with center section, folding wings, V landing gear, normal fuselage, and tail plane. It is equipped with the Douglas 46 cu. in. motor, geared by chain and sprocket to the propeller shaft. If one sees the Viget with no one standing by for comparison, one might suppose it to be a large, single bay biplane of the orthodox type. It is a surprise to many persons that the biplane should be used for light plane design. Its advantages and disadvantages are a constant source for argument in aeronautical drawing rooms. Prandtl has recently stated that, taken all in all, for any given class, a better biplane can be built than a monoplane. The Vickers machine, embodying the skill and experience of one of Great Britain's largest aeronautical establishments, can perhaps be taken to test this statement as far as it applies to the light plane.

"The fuselage of the Viget is a wire-braced girder structure with spruce longerons and struts. The longerons are of plane square section, while the struts have been spindled out to a cruciform section. The fuselage fittings are of a novel type, and appear especially suitable for light planes, where the longerons are of such small size as to render piercing out of the question. The fittings on the Viget are of Vickers duralumin, and are so designed as to wrap around the longerons, small woodscrews being used for locating the fittings on the longerons. The fittings are formed of two separate units, one for the vertical and one for the horizontal bracing. The horizontal portion is slipped into a cutout in the vertical component . . . . so that it becomes necessary to slide the fittings in to the longerons. It might be objected that it is thus impossible to replace a damaged fitting without dismantling the fuselage. While this is admittedly so, it is possible to meet the criticism by pointing out that a fitting should not need renewal, and that if the fuselage is accidentally damaged, the longerons are likely to need replacing in which case dismantling would be necessary anyway.

"In section the fuselage is rectangular as regards its main structure, but a shallow fairing has been added to the bottom and a much deeper one to the top, which latter serves to streamline the pilot's head and shoulders. The sides of the fuselage are flat.

"The pilot's cockpit is under the trailing edge of the top plane, as the machine is a vertical biplane, and in order to facilitate entrance a small door is provided on the port side. As the mainstructure of the fuselage is not very deep, while the deck fairing is of considerable height, this door enables the pilot to step into the cockpit without great difficulty. The controls are of the usual type, the joy stick being a Duralumin tube mounted on a universal joint. A complete set of instruments is carried, comprising air speed indicator, revs. indicator, altimeter and inclinometer.

The Power Plant

"The 750 c.c. Douglas flat twin air cooled engine is mounted in the nose of the fuselage, and is neatly cowled in. Immediately aft of the engine housing is a fireproof bulkhead, and from this the lower longerons are extended forward in the shape of two steel tubes. The top longerons of this portion are also tubes, but slope down at a sharp angle to meet the lower longerons. The forward ends of the steel tube structure thus formed are joined by cross tubes carrying the engine.

Vickers Viget light plane, fitted with a 46 cu. in. Douglas motorcycle engine which drives the propeller through a chain reduction gear

Contained in an aluminum casing, whose feet rest on the top of the engine crankcase, is a large sprocket carried on the propeller shaft, which latter rests in bearings in the casing and is provided with a small thrust bearing. The drive is by chain, and the size of the sprockets is such as to give a reduction gearing of 2½ to 1. The casing containing the propeller shaft and sprocket is braced at the top in a fore and aft direction by tubes from the engine bulkhead.

"As the propeller shaft is mounted above the engine, the latter is placed sufficiently low to allow of direct gravity feed from the tank mounted in the deck fairing behind the engine bulkhead. Thus no gasoline pumps are necessary, and the whole gasoline system is simplified.

"The undercarriage is of a normal V-type, built up of streamline steel tubes, and rubber cord shock absorbers are used.

Construction of Wings

"Constructionally the wings are of standard type, of wood construction and fabric covered. The wing section used is the R.A.F.15, and the biplane structure is only unusual in that the ailerons are of very large area and run right across. The top ailerons are hinged to the top corner of the upper rear wing spar, while the lower ailerons are hinged at the bottom corner. Inter-plane aileron wires connect upper and lower ailerons, and when these have been cast adrift the top ailerons can be folded upwards and the lower ailerons downwards. The wings are hinged at the rear spar, and when folded back, with the aileron flaps up and down respectively, lie back with their rear spars against the sides of the fuselage. Thus the folded width comes within that stipulated for the transport test of the competitions at Lympne (7 ft. 6 in.). When the wings are folded, one man can quite easily wheel the machine along the level road, although a steep hill might prove somewhat beyond the strength of the average pilot. The bottom rear spar is hinged to the forked ends of a tube running across the bottom of the fuselage, and the L-bolts in the front spar, by means of which the wings are locked in position when spread, are fitted with catches similar to those commonly found on umbrellas. A small tool in the form of a short tube is slipped over the end of the bolt and over the wire catch, depressing the latter so as to allow the bolt to be withdrawn.

"The tail of the Vickers Viget is of standard type, externally braced by streamline wires. Provision is made for adjustment of the tail plane while the machine is on the ground.

"This adjustment is of very simple type, but provides for quite a wide range of angles. The stern post of the fuselage is in the form of a steel tube. Around this tube is wrapped a piece of sheet steel open at the side facing the rear spar of the tail plane. The holes in the two members of the fitting are so staggered in relation to each other that a movement up or down corresponding to but a fraction of the diameter of the holes brings two sets of holes opposite one another. Thus a very fine adjustment is possible." *

The plan form of the machine is of the old school. The aspect ratio of the wings is just under 6, and of the tail plane, just under 3. With its area of 200 sq. ft., and its gross weight of 575 lbs., the wing loading is less than 3 lbs./sq. ft., and the power loading (with the Douglas engine at 20 hp.) about 30 lb./hp. The performance is said to give a climb of 270 ft./min., and a top speed of about 70 mi./hr.

The Lympne meeting last fall furnished an unusual variety of wing loadings and power loadings with a fair variety of aspect ratios. Unfortunately some of the most interesting machines were prevented from competing by engine trouble or tardy completion. One of these, the design of W. H. Sayers, had a power loading of nearly 100 lb./hp. and at the same time a wing loading of over 8 lb./sq. ft. After the meet this machine flew surprisingly well. One is tempted to wonder what would happen to the performance of the Vickers Viget if the wings were reduced by half their chord, leaving the span unchanged. The aspect ratio would be doubled, and the wing loading of course, also doubled. The efficiency would be increased considerably, but unless the structural weight were reduced, the climb would be lowered to an impracticable figure.

(To be continued)

National Balloon Race

All the seven balloons entered in the National Elimination Balloon Race started on April 23 from Kelly Field, San Antonio, Tex., as scheduled. The balloons got away easily, rising in a gentle breeze that swept Kelly Field from the South. The direction of the wind would carry the balloonists into Canada.

The pilot balloon rose in the air at 4:43 p. m., and the race was on. The pilot headed off slightly west of north, but the air reading indicated it would strike cross currents over Oklahoma or Mississippi and that it would then drift northeastward across the Mississippi River. The pilot balloon will remain in the air long enough to indicate the direction of the current.

Capt. H. E. Honeywell of St. Louis, veteran aeronaut, piloting the Kansas City Cooperative Club entry, was the first contestant to get away. His bag rose at 5:15 o'clock.

At five-minute intervals the other contestants gracefully took the air, the baskets swaying gently in the steady breeze.

As Pilot B. H. Fournier in his ship, representing San Antonio, rose just after Captain Honeywell, a great cheer went up from the thousands of San Antonians present.

Ten minutes after the first two ships went above, San Antonio was close on the "heels" of Kansas City.

The first Army pilot to get away was Maj. Norman W. Peek. He left the ground at 5:30. The balloons remained in sight for half an hour, gradually fading into the haze of the north.

The remaining pilots arose in the following order:

Fourth, Lieut. Ashley C. McKinley, A.S., fifth, Capt. Edmund W. Hill, A.S.; sixth, W. T. Van Orman, in the Goodyear III; seventh, Herbert von Thaden, in the Detroit, representing the Detroit Aviation Society.

All of the pilots were equipped for long flights, having plenty of food, water, coffee and warm clothing. It is the general opinion that they will be able to reach Canada, because of the unusually favorable conditions.

Captain Honeywell, who made his 550th flight the day of the race, predicted that a world's record would be broken.

W. T. Van Orman and C. K. Wollam, pilot and aide, respectively of the Goodyear III which won the National Balloon Race

According to unofficial information, the race was won by the balloon Goodyear III, W. T. Van Orman, pilot, and C. K. Wollam, aide, which landed near Rochester, Minn., covering a distance of approximately 1100 mi. The car of the balloon was wrecked on landing. H. E. Honeywell took second place, landing at Sanborn, Minn., a few miles from the Goodyear III. Third place went to the Army balloon piloted by Maj. Norman W. Peek, with Lieut. Robert F. Robillard as aide, who landed at St. Ansgar, Iowa.

*Flight, Sept. 20, 1923.

AIRPORTS AND AIRWAYS

Long Island News

At the Curtiss Flying School in Garden City several Curtiss-Standards and Canucks are being assembled or overhauled for the training of, and purchase by students. The reason is that Jennies are beginning to be scarce owing to the large number of these ships that have been acquired by students under the terms of their training contract. As most of our readers know, the tuition fee at the Curtiss Flying School entitles the student to the ownership of a JN, minus the motor. The latter can be acquired at a very reasonable price from the School.

Orioles are also flitting away to other airports. To replace one of them that found a purchaser, Casey Jones, general manager and chief pilot of the Curtiss Exhibition Co., last week went to the Buffalo plant of the Curtiss Company and brought back a new C6 Oriole via air. He made the trip in slightly more than 3 hr., which gives an average speed from Buffalo to Garden City of 110 mi./hr.—no mean performance.

* * *

The aerial messenger service which the Curtiss Exhibition Co. operated with signal success last year in connection with the Newspaper Enterprise Association—commonly known as the N.E.A.—will be considerably expanded this year. The fleet of C6 Orioles which was used on this service to rush across the continent films and photographs of important events will be enlarged by the addition of several high speed ships. One of these will be the Ansaldo Balilla on which Lloyd Bertaud won the American Legion Meet at Kansas City in 1921. The 400 hp. Curtiss K12 engine which the ship originally carried is now being replaced by a 160 hp. Curtiss C6 engine. The speed of the new combination ought to give well over 120 mi./hr.

* * *

The second Aeromarine Mail Plane has arrived at the Air Mail station and is being put through its paces. As was intimated before, the main gasoline tanks are now housed in the fuselage, and a nose radiator is fitted, so that the only parasitic obstruction on the top wing is a small, well streamlined pressure tank. The counter-balanced ailerons have been retained. Otherwise the ship is identical with the original Aeromarine Mail Plane.

The Mail DH with the Loening wings is also being tested. From advance information, which should in no way be considered as official, it appears that this ship has a top speed of over 125 mi./hr. and a landing speed of about 55 mi./hr., which represents an improvement of some 10 mi./hr. in speed range over the standard Mail DH.

* * *

Joseph Bellanca, the designer of the well known cabin monoplane bearing his name, who delivered last summer a set of experimental DH wings to the Air Mail Service, has rented a portion of the Sperry plant at Farmingdale for the purpose of building three additional sets of wings for the Air Mail.

Among recent visitors to Curtiss Field were Walter Brock, who puts in quite frequently from Philadelphia with his Fokker Express photographic ship; and George B. Post, of the Huff Daland Co., who was an interested spectator of Long Island activities after a lengthy sojourn at Pensacola and Brooks Field, Tex.

* * *

The Air Mail Service is laying out a number of emergency landing fields between Chicago and Cleveland with a view to extending the night flying facilities to the latter city. The night mail airway is also being extended from the western terminus, Cheyenne, to Rawlins, Wyo. This arrangement will give a greater flexibility to the night mail service scheduled to begin next summer.

Hasbrouck Heights News

The Rowe Fliers, who recently moved to Hasbrouck Heights, N. J., and the Chamberlin Aircraft Co., which has been operating from this field for several years, have combined their forces. The amalgamated company is known as the Chamberlin-Rowe Aircraft Corp. C. D. Chamberlin is president, and Basil Rowe is secretary and treasurer. Both are pilots of long standing and are carrying on an active business of aerial advertising and photography, with some passenger carrying and flight training.

The company owns thirty-three planes, including Avros, DH6's, Sopwith Camels and Snipes, Thomas-Morse Scouts, Boeings, Bellanca two-seaters, a Martinsyde F4 Fighter, etc.

Sadi Lecointe to Race in Dayton

Sadi Lecointe, the famous French flier, who has made nineteen world records since the Armistice and who is one of the world's foremost speed pilots, will participate in the Pulitzer Trophy race to be held at Wilbur Wright Field, near Dayton, on Oct. 4. Announcement to this effect was made by Frederick B. Patterson, president of the National Aeronautic Association at the dinner tendered him by the New York Chapter of the N.A.A. upon his return from Europe.

Lecointe will fly a special Dewoitine racer now being built in France, which will be fitted with the new 500 hp. Hispano-Suiza engine. This engine was developed for the aero engine endurance competition instituted by the French Under Secretary for Air.

Mr. Patterson also stated that F. Brak-Papa, formerly champion and test pilot of the Fiat planes, and now an officer in the Italian air force, may defend the Italian colors in the Pulitzer race, and that a Belgian team of pilots may be entered in some of the Dayton events.

It is also possible that there will be a British entry in the Pulitzer race.

Monmouth News

The Mid-West Airways Corp. of Monmouth, Ill., has completely overhauled its fleet during the winter months and is in fine shape for the flying season.

The Bréguet five-seater has had its motor thoroughly overhauled and the wings rebuilt. The trial flights, made April 18 by Pilot Livingston, showed an excellent performance, the speed of the ship having increased some 10 mi./hr. as a result of the reconstruction. The plane took off in less than 100 ft. with the pilot alone on board, who kept her nose up until he had reached an altitude of more than 1000 ft. and then put the ship through her paces.

The three-seater Standard of the company is being fitted with a new 150 hp. Curtiss K6 engine. In addition to this ship the Mid-West Company owns several Jennies for the training of students. Among the latest enrollments is Antonio Peira, from the Argentine Republic.

Testing Upper Air Conditions

Dr. C. Leroy Meisinger of the U. S. Weather Bureau and Lieut. James T. Neely of Scott Field, who left Belleville, Ill., on April 11 in a balloon, landed at Palmyra, Ont., after 24 hr. in the air.

The flight was one of a series of fifteen being made by Dr. Meisinger in cooperation with the Air Service to test the upper air conditions around storm centers. Lieutenant Neely, who piloted the balloon, said they left Scott Field slightly ahead of a storm, but the flight was made without mishap and a safe landing made in Ontario.

Boston News

By Porter Adams

It is a great pleasure to be able to report that Prof. Edward P. Warner of the Massachusetts Institute of Technology who is at the Phillips House of the Massachusetts General Hospital with a badly broken ankle is on the road to recovery and hopes to be able to leave the hospital within two weeks, although it will be some months before he is fully recovered.

* * *

The American Legion at Old Orchard Beach, Me., which last summer staged a very successful aviation meet and exhibit, is planning this year an even more elaborate affair to be held on Aug. 28, 29, 30 and 31. It is expected that much interest can be aroused at this time, and sanction will be applied for from the National Aeronautic Association. As formerly, the affair will be managed by Harry M. Jones, a veteran pilot and former army instructor who conducts the Old Orchard Flying School.

* * *

Plans are also being discussed for the holding of an aeronautical exhibit during the Brockton Fair and of having races on the opening days of Sept. 29 and 30, although it is realized that most aeronautical interest will be turning to Dayton at that time. It is believed that such an exhibit and meet however, will do much to interest the people of New England in aviation and if successful will become an annual feature of the fair.

The senate committee on Ways and Means of the Massachusetts Legislature has reported favorably on an appropriation of $9,000 to be used in improving and repairing the land leased to the Army at the Boston Airport. The amount originally requested was somewhat larger, but it is felt that much can be accomplished with this appropriation and it is especially gratifying to know that the state legislature is really interested in the development of the Boston Airport.

* * *

The Naval Reserve Air Station at Squantum, Mass., is now open and active flying operations will commence at once to train and qualify pilots for the Naval Reserve Force. Complete flight training over a period of months is given as well as a short period of training to previously qualified naval aviators.

During the week ending on April 18, thirteen flights were made from the Station and the total time in the air was 8 hr. 20 min. One Reserve Medical Officer and one Reserve Aviator reported in for thirty days active duty and one Reserve Officer for fifteen days active duty. Two students reported for forty-five days training.

The station now has in commission a 35 ft. motor boat, a 30 ft. motor sailing launch and a 30 ft. motor dory available at all times. The station was inspected on Thursday afternoon by Rear-Admiral L. R. deStieguer, U.S.N., Commandant of the First Naval District.

New Night Landing Device

A novel device for expediting the installation of lighted emergency fields and terminals for aircraft has been invented by Lt. Col. Harold E. Hartney of Washington and New York. His invention not only marks the flying field for the guidance of the pilot but also affords a very simple and efficient aid to incoming planes for landing at night.

The Bureau of Standards, the National Advisory Committee for Aeronautics, the National Aeronautic Association and the Airways Section of the Army Air Service have approved it in principle and cooperated with Colonel Hartney in its development.

This billboard landing device is set up in accordance with the general terrain, sometimes replacing a portion of the fence, and again lying at right angles to it. Pilots passing by day or night can tell at a glance just how they should approach that particular field to insure the best landing. At night they are guided to earth by an indirect system of lighting, which, it is said, makes it unnecessary to light up large areas or reveal dangerous obstacles. In other words the pilot sights along the billboard and then lands as easily as he would in the daytime.

An interesting feature of the new device is that it can be used as an advertising billboard for day and night use.

Preparing the Dayton Races

Discussion by the N.A.A. of plans for adding two more events to the twelve already decided on for the 1924 International Air Races, and tentative selection of courses for the various contests, marked preparations of the past month for the big gathering at Dayton on Oct. 2, 3, and 4.

The new events being considered are a race for National Guard pilots and an "On-to-Dayton" contest for Army, Navy, Marine and National Guard aviators. Following the discussion, the matter was placed in the hands of a special committee composed of Charles H. Paul, manager of the meet; Hugh W. Robertson, assistant manager; and Orville Wright.

The N.A.A. has also decided to set aside a sum of money for the promotion of "stunting" during the main events of the program. This action was prompted in a large degree by the many complaints against the long intervals of inactivity occurring during some of the races.

The race courses were picked out by B. Russell Shaw, executive vice-chairman of the Contest Committee, during a survey of Wilbur Wright Field with the manager and his assistant. The officials were assisted in the work by Maj. A. W. Robins, commandant of the station, who had assembled considerable data on the surrounding country.

With the matter of the starting and stopping point for the races settled, it was comparatively easy to choose the location for the seats and automobile parking space. A natural amphitheater, a little removed from the hangars, was picked out for the seats, while it was decided to park machines nearby where hundreds of acres are available.

The railroad officials met with Paul E. Ackerman, chairman of the Traffic and Transportation Committee, at the N.C.R. It was announced at the meeting that the steam lines would run "shuttle" services between Dayton and the race site.

Headquarters for the International Air Races have been opened at 217 Realty Building, Dayton, across the hall from the Chamber of Commerce.

Arrangements have been completed for having the Goodyear Tire and Rubber Co. furnish a display in connection with a lighter-than-air exhibit during the meet. Among the larger craft expected are the reparations Zeppelin ZR3, the Shenandoah, the RN1, America's largest non-rigid airship, and the RS1, now under construction, which was designed as a mother ship for fighting airplanes to which they could alight and take off.

Dayton News

By Maurice C. Hutton

Although the Pulitzer race with the promised entry of Sadi Lecointe, bids fair to become the most popular event of the International Air Races, indications are that the two events for light planes will also come in for a good share of interest. Work has been started on a number of entrants for this contest in colleges and factories, leading officials to believe that the first inter-collegiate airplane race will be seen this fall. The tendency to name the small ships after cities may develop into a spirited rivalry among municipalities.

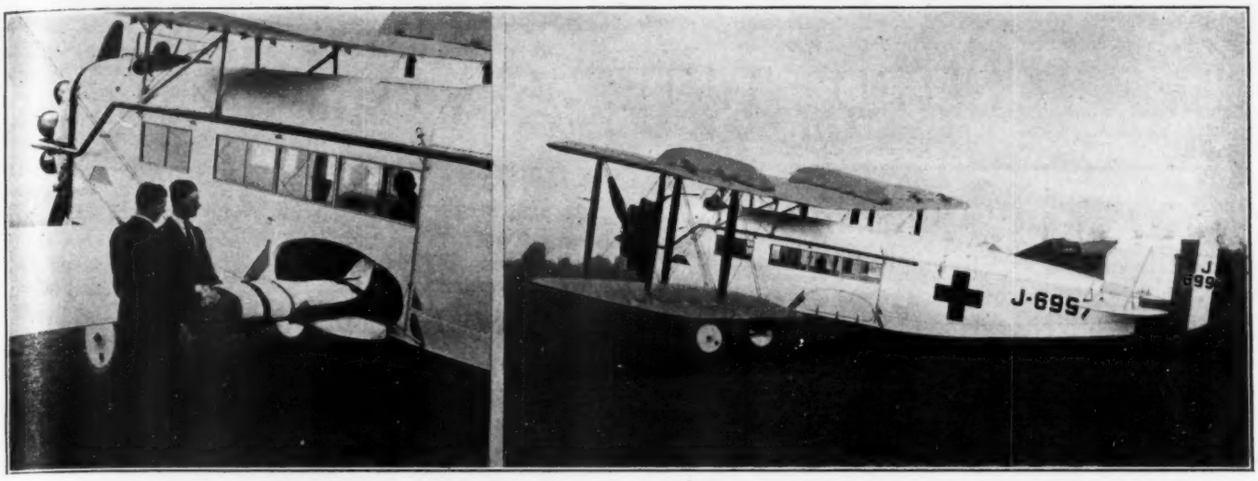
The Goodyear Tire & Rubber Co., of Akron, has started construction of a light airplane to be known as "Miss Akron." Another is being built by the University of Detroit to be christened "Miss Detroit." Before many weeks it is expected to hear from the aeronautic departments of the University of Michigan and Boston Tech.

New N.A.A. Committees

Since the original committees were named by Frederick B. Patterson, president of the N.A.A., sub-committees have been appointed to the Executive and Financial Committees. Members of the new body functioning with the Executive Committee are: Frederick B. Patterson, Fred H. Rike, Col. Frank T. Huffman, George B. Smith, I. G. Kumler, W. B. Moore, John C. Haswell, Orville Wright, and Ezra M. Kuhns.

The sub-committee to the Finance Committee is composed of John C. Haswell, Col. Frank T. Huffman, and George B. Smith.

Meeting for the first time, the Advisory Committee consisting of officers from McCook and Wilbur Wright Fields, selected Maj. A. H. Hobley, adjutant at McCook Field, chairman.



Two views of the new Bristol Ambulance plane, fitted with the 400 hp. Jupiter radial air-cooled engine

Bristol Ambulance Plane

The new Bristol Ambulance plane which is illustrated above was developed upon the experience obtained with the Bristol Commercial biplane.

The large and airy cabin, which is absolutely free from cross members or wires, is 5 ft. 9 in. high, 10 ft. 6 in. in length and 4 ft. wide and along the whole length of each side of the cabin are windows which can be opened. Accommodation is provided for two stretcher and four sitting cases, or three of the patients can be accommodated on stretchers if desired. The inside of the cabin, which is finished in white enamel, contains all the necessary medical and other conveniences for the patients, and tankage has been provided for a sufficient fresh water supply. A specially wide door for the admittance of stretchers has been made in the side of the fuselage opposite the ordinary access door.

The engine installed is the 400 hp. Bristol Jupiter radial air-cooled engine, fitted with a swinging mounting which affords easy and immediate access to the back of the engine.

ZR2 Memorial Unveiled

A memorial to the American and British airmen killed in the loss of the airship R38 (ZR2) in 1921 was unveiled at Hull, England, on April 11 by Air Marshal Sir Vyell Vyvian and dedicated by the Bishop of Hull.

The memorial is in the form of a Celtic Cross, 16 ft. high and with two bastions on either side. A bronze plaque on the right bears the names of the Americans lost. On the left a similar plaque bears the names of the British dead and in the center is a dedicatory bronze tablet, inscribed: "To the glory of God and in memory of the officers and men of the Royal Navy and of the rigid airship detachment of the United States Navy, members of the staffs of the National Physical Laboratory and of the Royal Airship Works, lost in the airship R38 (ZR2), August 24, 1921."

To Fly Around Little Entente

The Czechoslovak Ministry of National Defense is organizing a military airplane flight around the Little Entente States. Starting from Prague, the machines will be flown to Jassy and Bucharest, Rumania; Belgrade and Agram, Jugoslavia; Bratislava, Czechoslovakia, and back to Prague, a distance of 1,900 mi. It is planned to complete the circuit in fourteen days.

Air Force Pacifies Colony

Italian military airplanes continue to play a part equal to the infantry and cavalry operations against the rebels in Cyrenaica, North Africa. Three planes recently engaged several companies of rebels, forcing them to retire with heavy losses. Other operations in the district have resulted in the killing of 300 rebels in three encounters, while the Italian losses were negligible. The colony now is reported as calm.

Canada to have Permanent Air Force

The Dominion of Canada is to have a permanent air force representing its proportionate share of the air defense plans of the British Empire, according to official information reaching Washington.

Air service squadrons will be stationed at Vancouver, B. C.; Winnipeg, Man., and Dartmouth, N. S. Additional sites will be designated as necessity demands. Long Branch, near Toronto is to be made the central airplane depot and station of the Dominion, and all permanent force details in the Provincial capital are to be moved to that reservation. Up to the present time the principal peace time activities of the Canadian Air Force consisted in forest protection, custom service, photographing, surveying new country, and protecting fisheries.

An Unusual Record

An unusual air record is reported from Stuttgart, Germany, where on April 14 a glider fitted with an engine developing only eight-tenths of one horsepower is said to have carried its pilot and a passenger a distance of 75 mi. in 2 hr. 2 min., and to have reached a height of 3630 ft. The occupants of the machine were M. Schrenk and W. von Langsdorff, who claim the performance is a new world record for two-seater gliders in point of distance, duration and height.

(Inasmuch as this machine was fitted with an engine, it is difficult to see how the performance can constitute a record for gliders.—EDITOR.)

Nansen to Try Pole Flight

It is reported from Moscow that Dr. Fridtjof Nansen, Norwegian explorer, has consented to undertake with the Russian airman Rossinsky a flight to the North Pole. According to the latter, while approving the plan, Dr. Nansen has cabled that he will soon arrive here to discuss details. A specially designed airplane would be used.

Dr. Nansen is sixty-three years of age and has not engaged in exploration for many years. Since the war he has devoted himself to relief work under the auspices of the League of Nations. He was one of the first to suggest a flight to the Pole.

New British Amphibians

The Supermarine Aviation Co., Woolston, England, will extend their flying boat slipway to 104 ft. in length and 30 ft. in width, in order to facilitate the launching of very large amphibian flying boats, which are expected to be ready in about three months' time.

The Commander of the Air Force station at Calshot has sought permission of the Southampton Harbour Board to place a floating dock for seaplanes in Southampton water off Hamble Spit, Consul John M. Savage, Southampton reports.

UNITED STATES AIR FORCES

U. S. ARMY AIR SERVICE

Long Direct Course Flight

A remarkable "direct course" flight with the assistance of a new instrument, the Earth Inductor Compass, was made April 18 from McCook Field to Mitchel Field via Albany, N. Y. by Lieut. Hugh C. Downey, A.S. and Bradley Jones, instrument expert of the Air Service. The map case of the plane was sealed before the take-off.

The plane used on this flight was a Navigation DH from McCook Field.

In flying to Albany the airmen held to an altitude of 10,000 ft., being above the clouds a large part of the time. The distance is 575 mi. and in spite of a strong wind they were only 5 mi. off their course when they reached Albany. This is the first flight on which the earth inductor was the sole flight indicator. There were no maps and they were so high above the earth that they could see few landmarks. Mr. Jones said that their flight proves the practicability of the new instrument and added:

"It will change completely the conditions under which long distance flying is done and may even make possible night flying for great distances. No longer will the aviator have to wait for favorable conditions so that he can see clearly the mountains and rivers which he is flying across in order to guide his course, but he may fly on any day, fair or cloudy, clear or haze, without fear of going far from his course."

The flight was a government experiment to test the compass, which has been developing for several months. The instrument uses the earth itself for its principal part. Hitherto, the old type of magnetic compass used by seagoing ships, has been affected by steel and iron, but the new instrument marks the earth lines of magnetic force from the north to the south pole, and the armature is revolved in the earth's magnetic field, taking the earth itself as the magnet.

The instrument is like a cylinder, 10 in. in diameter and 8 in. high. The armature is revolved by electricity, generated by a wind mill back of the cockpit. The compass is in the tail of the ship, away from iron and steel motor parts, and its recordings are transferred over electric wires to a dial in front of the navigator's seat. Once the course has been set any deviation is shown on the dial by a galvanometer.

The course from Dayton to Albany was northeast of north and the compass was set at 66 deg., counting north as zero and south as 180 deg. However, allowance had to be made at certain distances to overcome the difference between the true north and the magnetic north, and this was estimated at a total of 14 deg. declination for the course.

The compass is supplemented by a drift indicator and speed indicator. The course is set before the flight begins, the prevailing wind being taken into consideration. Thereafter the only changes are for declinations. These changes are made by the navigator.

A Record Parachute Jump

Corp. C. E. Conrad established what is believed to be a record for altitude jumping from a service type ship not equipped with a supercharger, when on Feb. 27 last at Kelly Field, Tex., he reached terra firma safely after floating through the air for a distance of 21,500 ft.

Lieut. L. S. Andrews, piloting a service type DH4B airplane, took off at 10:35 a. m. with the object of reaching the highest altitude possible for a parachute jump. Although many persons at Kelly Field watched the ship take off, none could follow it when it reached the higher altitude, and the first indication the watchers knew that Conrad had jumped was when they saw the little patch of white which indicated that the chute had opened. In 1 hr. 5 min. Lieutenant Andrews reached an altitude of 21,500 ft. At this juncture the motor began missing, due to the fact that the spark plugs had become fouled. It is believed that at least 1000 ft. more could have been reached had motor trouble not been encountered. Anxious moments were spent by the pilot and jumper when, due to the extreme cold, it was necessary for Lieutenant Andrews to place Conrad's numbed hand on the ripcord ring. At 11:45 a. m. Conrad slipped off into space, and 15 min.

Wide World Photos

Lieut. H. C. Downey and Bradley Jones, with the sealed map which they dispensed with on their direct course flight from Dayton to Albany, N. Y.

later landed in South Brazos Street, San Antonio, conscious of having grasped a parachute record and both hands full of mud. He was slightly bruised about the face and narrowly missed a house, but aside from this and the mud, he experienced but few hardships.

440th Observation Squadron (Reserve)

The members of the 440th Observation Squadron, Air Service (Reserve) were the invited guests of the Kiwanis Club of San Jose, Calif., recently at their regular weekly luncheons. The principal speaker was Col. W. E. Gillmore, Air Officer of the 9th Corps Area, who emphasized the necessity of the local men getting behind the home town squadron.

He mentioned the wonderful work accomplished at the government testing field, and stated that Congress had made better provision for this field than any other part of the government air program, the results achieved amply justifying the outlay. Among the tests that have been made he mentioned one of a man who claimed to have a very superior type of parachute which he would like to have tested. After much pestering he was sent to the field and told that he would have to make the jump himself and that he would have to wear the regulation Army chute. He objected to this as every one who had seen his device told him that it could not fail to open (it was supposed to be opened with springs). Finally, he condescended to wear an Army chute in order to get his tested. He was taken up about 8,000 ft. and then he jumped. At 5,000 ft. his springs had failed to work, so he had to fall back on the Army chute and came down safely. Colonel Gillmore stated that the man and his parachute were never heard of again.

The lecture was closed by showing three reels of moving pictures demonstrating various types of present day ships, parachute jumps, etc.

Flying Time by Reserve Officers

The following table shows the flying time of Reserve officers at various flying fields for the months of January and February, 1924. It will be noted that Clover Field heads the list in January by a considerable margin, while Salt Lake City Airdrome heads the February list. Spaces left blank indicate stations not yet reporting.

	January		*February*	
Fields	*Hr.*	*Min.*	*Hr.*	*Min.*
Bolling Field, Anacostia, D. C.	0	0	0	0
Bliss, Fort, El Paso, Tex.	–	–	0	0
Chanute Field, Rantoul, Ill.	1	0	2	10
Crissy Field, San Francisco, Calif.	74	25	–	–
Hawaiian Territory	0	0	1	30
Kelly Field, San Antonio, Tex.	7	0	0	0
Langley Field, Hampton, Va.	–	–	0	0
Logan Field, Baltimore, Md.	4	12	–	–
Marshall Field, Fort Riley, Kans.	0	0	0	0
Mather Field, Sacramento, Calif.	0	0	0	0
Maxwell Field, Montgomery, Ala.	0	0	0	0
Mitchel Field, Long Island, N. Y	18	50	15	50
Panama Department	0	0	0	0
Philippine Department	–	30	–	–
Philipps Field, Aberdeen, Md.	42	54	5	37
Pope Field, Fort Bragg, N. C.	3	10	0	0
Post Field, Fort Sill, Okla.	0	0	18	5
Rockwell Field, Coronado, Calif.	24	25	16	15
Ross Field, Arcadia, Calif.	0	0	0	0
Scott Field, Ill.	0	0	0	0
Selfridge Field, Mt. Clemens, Mich.	3	5	–	–
Sheridan, Fort, Ill.	0	0	0	0
Wilbur Wright Field, Dayton, Ohio	0	0	0	0
Airdromes				
Boston Airport, Boston, Mass.	7	25	0	45
Bowman Field, Louisville, Ky.	0	0	0	0
Clover Field, Santa Monica, Calif.	174	36	–	–
Grisard Field, Cincinnati, Ohio	6	11	7	20
Norton Field, Columbus, Ohio	15	20	18	30
Pittsburg Airdrome, Pa.	–	–	–	–
Portland, Vancouver Bks., Wash.	–	–	–	–
Richards Field, Kansas City, Mo.	9	20	9	10
Salt Lake City Airdrome, Utah	25	–	25	20
Schoen Field, Ft. Benj. Harrison, Ind.	32	–	21	5
Seattle, Sand Point, Wash.	–	–	–	–
Total	449	53	141	37

Army Orders

Orders Dec. 7 First Lieut. Frank P. Albrook, A.S., to Chanute Field, after present foreign service tour, amended assigning Lieutenant Albrook to Fairfield A.I.D.

Orders Dec. 7 First Lieut. John M. Clark, A.S., to Brooks Field, after present foreign service tour, amended assigning Lieutenant Clark to San Antonio A.I.D.

Orders Dec. 14 First Lieut. Eugene C. Batten, A.S., now en route to U.S. from Philippines, to Brooks Field, on completion present foreign service tour, revoked. After leave granted, Lieutenant Batten will proceed to McCook Field for duty.

Capt. Lynwood B. Jacobs, A.S., Langley Field, to A.S., Philippine department, Manila, by transports sailing New York and San Francisco July 12 and Aug. 1, respectively.

First Lieut. James E. Troupe, A.S. (C.A.C.), relieved A.S. detail, Brooks Field, and assigned Pensacola coast defenses, Fort Barrancas, after leave granted.

U. S. NAVAL AVIATION

Motors of ZR3 Tested

The five 400 hp. Maybach engines of the Zeppelin airship ZR3 are now being tested in Friedrichshafen, Germany, where the ship is being built.

Dr. Hugh Eckner, director of the Zeppelin Company, who will pilot the ZR3 to Lakehurst, N. J., recently declared that he was making no promises, but that he hoped to begin the flight early in June.

Helium Re-purification Plant at Lakehurst

The Navy Department is much gratified with the reports which have been received of the success of tests of the recently completed helium re-purification plant at the Naval Air Station at Lakehurst, N. J. An increase in the lifting capacity of the Naval airship Shenandoah by more than two tons bids fair to be the outcome of these tests.

This plant is used to re-purify the gas that has been contaminated through use in the airship. When the gas was removed from the airship last January and February, it was found that its purity had fallen as low as 90 per cent. One feature of the use of helium as an inflating medium for airships is that it can be re-purified and used over again indefinitely. Recent tests with the re-purification plant at Lakehurst have resulted in a purified helium of 98.4 per cent, which is the highest purity percentage that has ever been obtained outside of a laboratory. This plant has an operating capacity of 20,000 cu. ft. per hour, and the results of its operations indicate that when the airship is ready to fly next month, helium with a purity of 98 per cent or more will be available for its inflation.

The original filling ofhelium gas for the airship, as it was received from the Helium Production Plant at Fort Worth, Tex., had an average purity of about 93 per cent. On account of the high purity of the gas obtained after the operations of the re-purification plant, it has been estimated that the total lift of the airship using the re-purified gas will be 4.8 per cent greater than when originally filled with gas from the Production Plant in Texas. Considering the operating volume of the ship, this gives an increase in lift of over 4,400 lb.

Several riggers, attached to the airship, have been learning metal work, such as riveting, etc., so that in the future minor structural repairs to the airship can be made by the crew. The overhaul of the engines of the Shenandoah has been almost completed by the crew, who have also been doing all the fabric work on the airship.

It is understood that the Shenandoah will carry out various scouting exercises off Newport, R. I. next summer.

Navy Planes Make Aerial Surveys

The value of the peace time activities of aviation in the Navy is illustrated by two recent aircraft operations in the Caribbean.

The possibility of a shortage of rubber has caused the Department of Commerce to initiate investigations of possible sources of rubber supply that would be easily accessible and available for the American demand. The U.S.S. Curlew, and planes from the Naval Air Station at Coco Solo, C. Z., with representatives of the Department of Commerce, have within the past month completed a survey of areas in the vicinity of the Gulf of Darien. The areas comprised low swamp lands, and the aerial survey completed in several days' work that would ordinarily have required several months. The representatives of the Department of Commerce expressed themselves as being completely satisfied with the results obtained.

CALENDAR OF AERONAUTICAL EVENTS

March 25.	Start of the British World Flight, Southampton, England.
April 6.	Start of World Flight of the U. S. Army Air Service, Seattle.
June 3-11.	International Aircraft Expositon, Prague, Czechoslovakia.
June 15.	Gordon Bennett International Balloon Race, Brussels, Belgium.
June 21.	Annual F.A.I. Conference, Paris, France.
June 22.	Commodore Beaumont International Cup Race for high speed airplanes, Istres, France.
July 5-6.	Zenith International Airplane Efficiency Race, Paris, France.
August.	"Tour de France des Avionnettes." International Round-France race for light airplanes.
Oct. 2-4.	International Air Races, incl. Pulitzer Trophy Race, Dayton, Ohio.
Oct. 24-25.	Schneider Cup Race, Baltimore.
Dec. 17.	Twenty-first anniversary of the first successful airplane flight.

In the near future planes of the Aircraft Squadrons Scouting Fleet, now in the Caribbean, will undertake a preliminary survey of Batabano Bay, on the southern coast of Cuba. This work is designed to lead to the development of a deep water channel to Batabano City, which will then be in a position to act as a shipping point for products of the Isle of Pines and the adjacent interior of Cuba. At present it is necessary to transport the products of the Isle of Pines to Havana for further shipment, and similarly, it has also been necessary to ship the products of the part of Cuba near Batabano to Havana by rail. The development of a deep water channel to Batabano will reduce the time and cost of transportation of the products from the above sources and will do much to relieve congestion at Havana.

The use of airplanes to make a photographic survey, according to the Navy hydrographers in charge of the work, will make possible in the course of a few days a survey that would take six months by means of surface craft alone.

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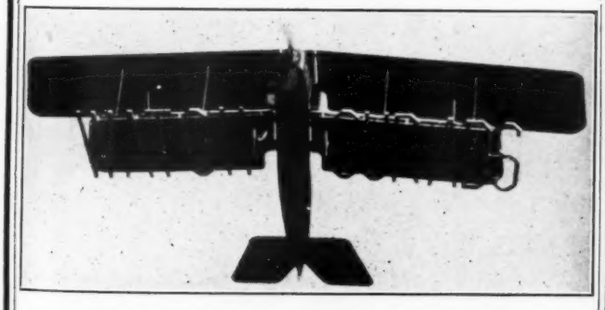

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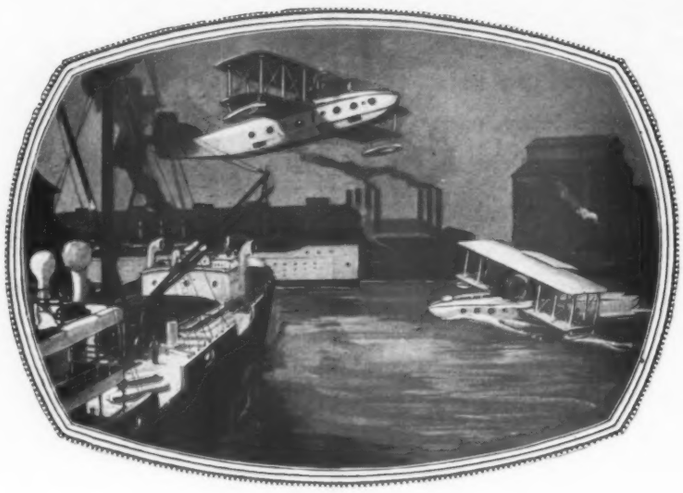

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